

# The Iron Age

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## A Review of the Hardware, Iron and Metal Trades.

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### Evading the Interstate Law by Under-Billing.

According to the *National Car-Builder* there is every reason to believe that the working of the Interstate law has in some quarters led to the systematic under-billing of freight. There is said to be more ways of killing a cat than by choking it with butter, and the freight agents appear to recognize the fact that there are more ways of favoring shippers whose patronage they are willing to cultivate by law breaking than by giving them the forbidden rebates on freight charges. Giving rebates on freight charges was an awkward method of favoring the large shipper at the expense of the smaller one, but it was not open to some of the disadvantages of under-billing. The men who attended to the giving of illegal rebates might receive training in dishonesty that would be likely to bear evil fruit in its season; but the practice would scarcely be more demoralizing than that of daily

pounds. The shell, with its conical head, is all in one piece, being forced into shape by a heavy hydraulic ram. The drawing of the shell was witnessed by Lieutenant Zalinski and G. H. Reynolds, consulting engineer of the Pneumatic Dynamite Gun Company. The shell is intended to carry 600 pounds of explosive gelatine, shells carrying 55 pounds only having been used in the recent experimental trial in New York Harbor, when a small vessel was demolished at a distance of a little over a mile.

### A Successful Smoke Preventer.

The progressive citizens of Chicago—those who are anxious that the city shall in all respects be made a desirable place of residence—have been endeavoring for years to abolish the smoke nuisance accompanying the careless use of soft coal. Of course the greatest source of annoyance in this respect is the burning of soft coal for raising steam

who were sincerely seeking a good smoke consumer, that for the past 15 years he has had in use a smoke-consuming apparatus which does consume smoke. It is known as the Woodson patent, but is now open to the use of anybody without royalty, as the patent ran out last year. It is described as being very simple in its arrangement. A boiler-plate drum 18 inches in diameter runs horizontally through the furnace from side to side about 12 inches above the grate and 2 feet from the doors of the furnace. The space above the drum to the boiler is bricked up so that the smoke and heat generated in front of the drum must pass down under the bed of fire and under and in rear of the drum in order to find its way to the flue in the rear, and the smoke, in passing through the fire, is absolutely consumed and destroyed. The coal is first thrown in the front, where it is coked and all smoke eliminated, after which it is shovelled under the drum into the back furnace with iron bars and fresh coal is fed in

in favor of this consumer is that it costs but \$150 and can be attached to any furnace without requiring a change of boilers or the remodeling of the entire furnace.

### Is the Condition of Laborers Growing Worse?

It is a common complaint not only among labor agitators, but among others who should know better, that "the rich are growing richer and the poor are growing poorer," and that the rewards of labor are growing less. Some rich men are undoubtedly growing richer, but are the working classes growing poorer? This question was well answered by James Bartlett, a Massachusetts machinist, in an address at the Michigan semi-centennial on the progress of machinery in the last 50 years. Speaking from memory he said: "The wages of a machinist in shops, in 1843, were \$1 to \$1.25 a day; one nabob of a pattern-

### Universal Boring, Drilling and Milling Machine.

One of the most interesting and noteworthy tools now in the machine shops of the Brooklyn Navy Yard is a heavy universal boring, drilling and milling machine, designed and built by the Niles Tool Works, of Hamilton, Ohio. During a recent visit to the Navy Yard we were furnished with an opportunity to examine the machine in detail, and are enabled now, through the courtesy of the builders, to lay before our readers a number of engravings, which give a very fair idea of the nature of the design. We should here direct attention to the fact, however, that the two perspective views and the elevation and plan do not agree in some minor points, this being due to the fact that the machine was somewhat modified in design after the blue prints with which we were furnished had been made. Figs. 1 and 2, on the other hand, were made from photographs of the finished tool.

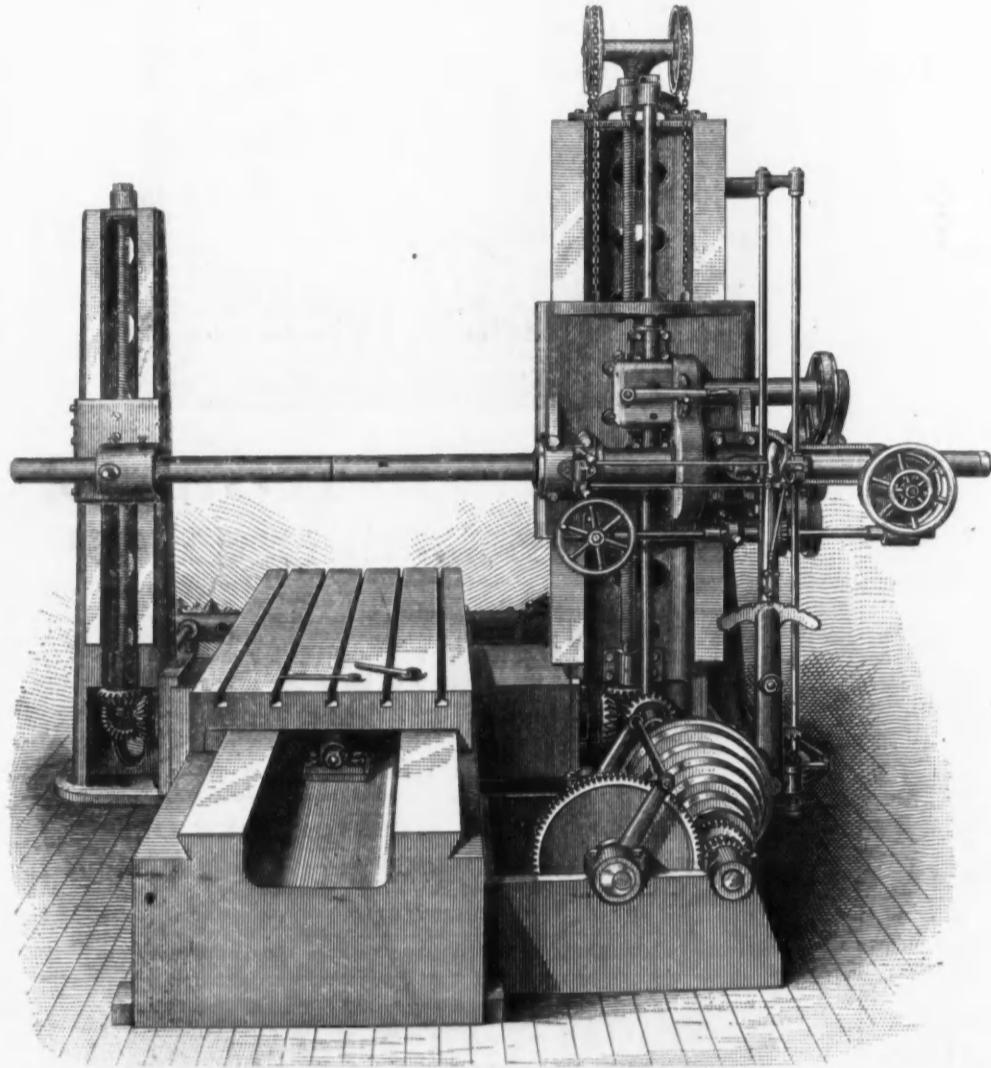


Fig. 1.—Front View.

(For Elevation and Plan, see pages 16 and 17.)

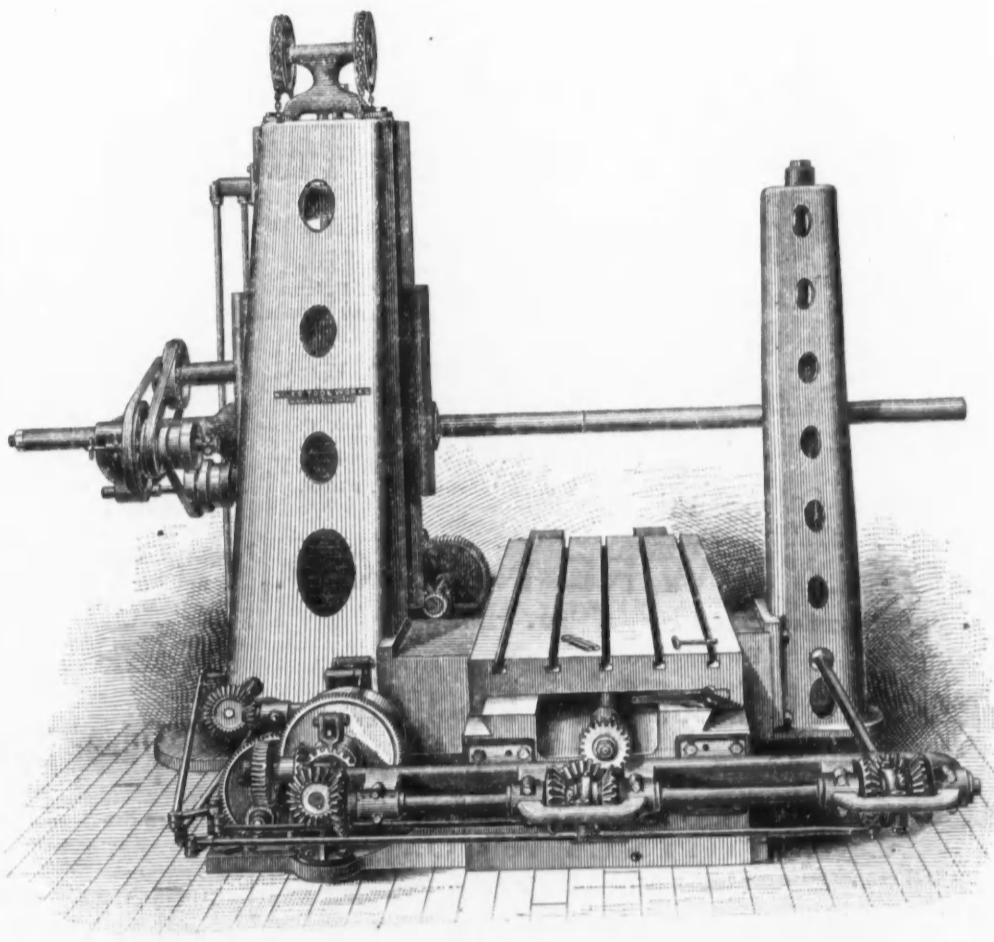


Fig. 2.—Rear View.

UNIVERSAL BORING, DRILLING AND MILLING MACHINE AT THE BROOKLYN NAVY YARD, BUILT BY THE NILES TOOL WORKS, HAMILTON, OHIO.

making the false representation that a ton was only 1000 pounds or less. The latter practice also entails a cause of danger from which the former was free. Cars are liable to be so overloaded that dangerous accident will result. We recently learned particulars of a case where the axle of a car broke, causing considerable damage. The car was billed to contain 23,000 pounds, and the actual load was found to be 58,000 pounds. This is too great a difference between the pretended and the real load, which indicates that the men who are engaged in this means of cheating are blunderers in the art they are cultivating. Railroad managers ought to see to it that general freight agents who undertake to beat their competitors by under-billing do not get the companies they represent into serious trouble. For instance: A car is stenciled to carry 30,000 pounds, which is implied to be the safe load. To meet the plan of under-billing, a load of 50,000 pounds is put into the car, and before it reaches its destination an axle breaks, killing one or more trainmen. When this or a similar case happens, and it will come in time if the practice is persisted in, some one will be liable to be tried for manslaughter. It is a pity some one could not be convicted of murder.

A Large Shell for the Dynamite Gun.—Brown & Bros., of Waterbury, have completed the shell for a projectile of enormous size for the dynamite gun to be used on the new cruiser now being built for the Government. It is a seamless drawn brass shell, 6 feet 8 inches long, 14 inches inside diameter,  $\frac{1}{4}$  inch thick, and weighs 200

In the hope that a considerable part of this annoyance could be checked they succeeded in persuading the City Council to enact a stringent ordinance declaring the production of smoke a nuisance, punishable by fine, and authorizing the appointment of a Smoke Inspector to note infractions of the ordinance and proceed against the offenders. Since the adoption of this measure a succession of incumbents of the office has endeavored, with more or less zeal, to grapple with the problem. Smoke preventers without number have been brought forward by enthusiastic inventors, who have induced well-disposed citizens to introduce them in their desire to comply with the city regulations and also to avoid the penalty imposed for producing smoke. So many of these devices, however, have shown themselves to be partial failures, or actually injurious to steam boilers, that they have been abandoned after a short trial, and the users have become convinced that smoke consumers generally are "no good." The present smoke inspector of Chicago, after spasmodic attempts to exercise his official duties, seems to have become impressed with this view of the case also, and in recent interviews with daily newspaper reporters, he has spoken very discouragingly of the prospects of the success of the anti-smoke movement. His assertions of the failure of all smoke consumers, however, were hardly in print before they were directly contradicted by Edwin Lee Brown, of Brown Bros. Mfg. Company, whose factory for the production of sidewalk lights is located on the corner of Clinton and Jackson streets.

Mr. Brown stated, for the benefit of the public generally and in the interest of those

its place. With fine coal a little smoke can be detected coming from the chimney at the time of firing, but with coarse coal it does not smoke at all. This drum is supplied with hot water from two 5-inch circulating pipes, one on each side of the boiler on the outside and connected with the ends of the drum through the walls of the boiler. The water is fed into these pipes from the mud-drum in the rear of the boiler. From the large drum in front there is a 6-inch connecting pipe with the boiler through which the water passes, keeping it constantly in circulation, and thereby making the drum not only a means of heating the water but a generator of steam. The purpose of the drum running through the bed of burning coal is simply to shut out the smoke of the front or coking furnace from the rear furnace, which connects directly with the flue and chimney; the water is introduced to the drum for the purpose of preventing its burning.

The cheapest Illinois soft coal is used in this furnace, costing only \$2.65 per ton delivered at the works, but the chimney is as guiltless of smoke as though the purest anthracite was being consumed. The boilers are 5 x 16 feet, supplying power to a 20 x 48 inch engine and heat to a 4-story building 90 x 100 feet, and but 2½ tons of this cheap coal are required per day. It is sufficiently shown that all smoke is consumed from the fact that the flues of the boilers are cleaned but once a week, and then not  $\frac{1}{4}$  inch of soot is found in them, while in furnaces not using a smoke consumer the flues of the boiler require to be cleaned every day and are always found heavily clogged with soot. A strong point

maker received the great sum of \$1.50. They went to work at 5 o'clock in the morning and worked till 7.30 at night, with an hour for breakfast and three-quarters for dinner. It was several years before we obtained 11 hours a day. It has now been 10 hours a day for 25 years or more, and we grumble at that, though we may get more than twice the wages we did 40 years ago; and we are hoping to get the same or higher pay for working eight hours. I know the condition of the machinist is better than it was when I first joined the guild; he has better pay, better houses, better education, better living; and I hope he will keep on improving for the next 50 years. Large machine shops were started before 1830; one in Lowell employed over 1000 men on cotton machinery. Now, the country is dotted with them. For my part, I do not want any more of the good old times. The present time is the best we have ever had, though I hope not the best we shall ever see. In 50 years we have reduced our hours of labor from 14 to 8 hours a day; our wages are doubled, and the necessities of life are much cheaper (a barrel of salt, which cost \$3.50 years ago, has been sold in Michigan for 75 cents). The great curse of drunkenness is very much diminished. We live in better houses, better warmed and lighted, and we are better clothed; a high-school education is within reach of every child; books are free to all; the poorest laborer, who meets with an accident in our streets, receives surgical aid that no king could purchase 50 years ago, and our great railroads distribute the fruits of labor so that famines are impossible."

The machine was built specially for boring and drilling holes in large and heavy pieces of work, and the movements to be provided were: 1, Longitudinal adjustment of the table to any desired position with the work clamped upon it; 2, Vertical adjustment of the saddle carrying the boring bar or spindle to any desired height; 3, Revolving motion and feed to the boring spindle suitable for any diameter of bore within the range of machine—all of the above movements to be effected by power. Figs. 1 and 2 on this page represent respectively front and rear views and show the general construction. The bed, which is 18 feet long, carries a table measuring 12 feet by 3 feet 5 inches. This table has a traverse of 10 feet on the bed and is moved by a screw underneath, operated by power.

Against the side of the bed is firmly bolted the main column A (see Figs. 3 and 4 on pages 16 and 17) of large section, 32 inches wide on the face and 10 feet high. The saddle carrying the boring spindle G is 40 inches square, and has a vertical adjustment of 60 inches on the face of the column. It is balanced by a counter-weight hanging in the body of the column, and is moved up and down by a heavy screw operated by power. Against the opposite side of the bed is bolted an auxiliary column, having on its face the outboard bearing for the boring bar G, adjustable vertically by a screw B. This screw is connected to the saddle screw by a shaft, C, and bevel gearing causing both screws to revolve with equal velocities, and maintaining the boring bar always parallel with the top surface of the table.

(Concluded on Page 16.)

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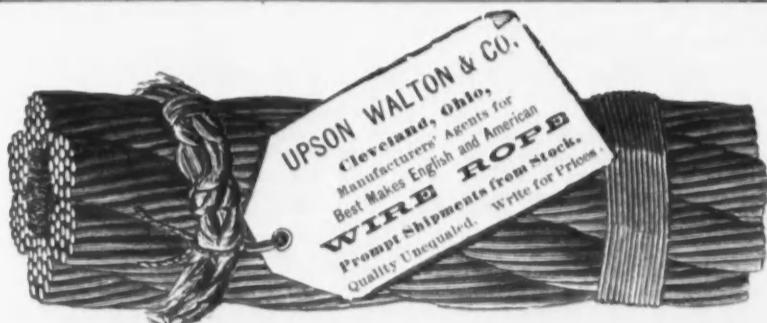
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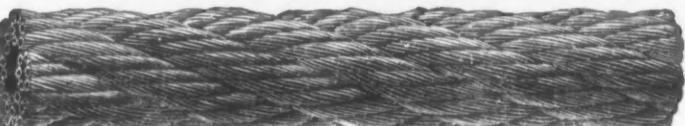
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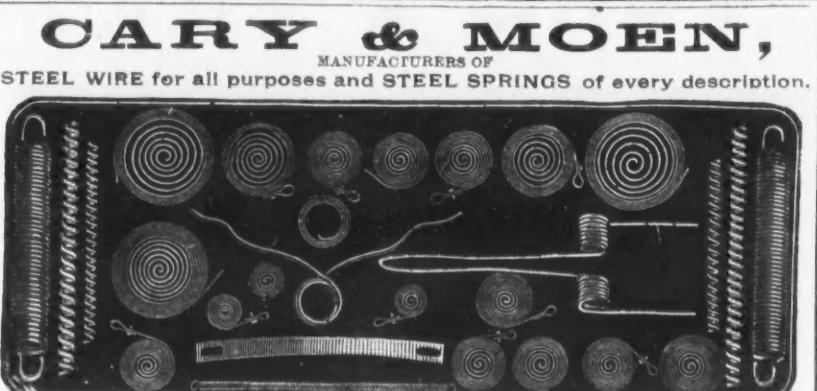
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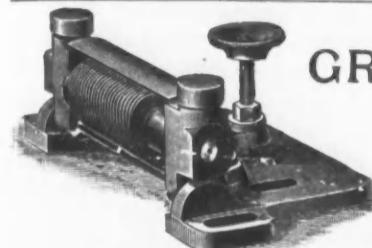
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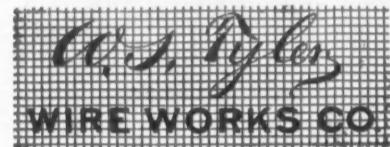
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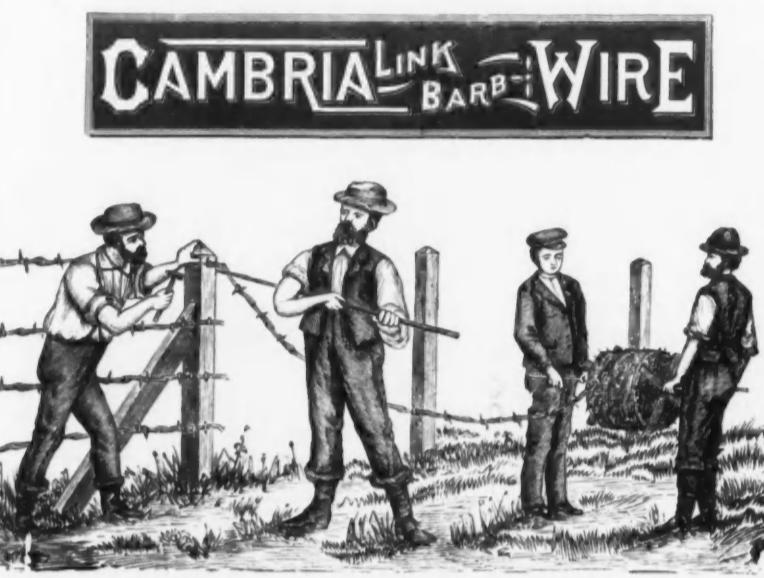
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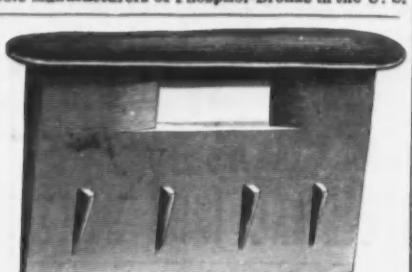
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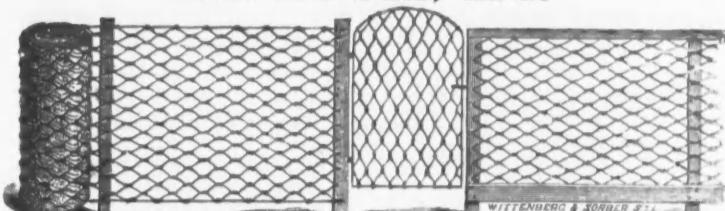
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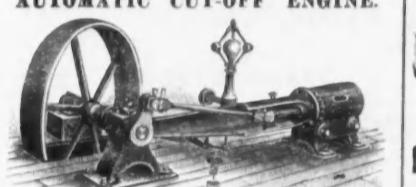
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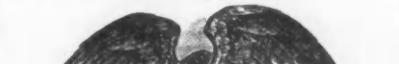
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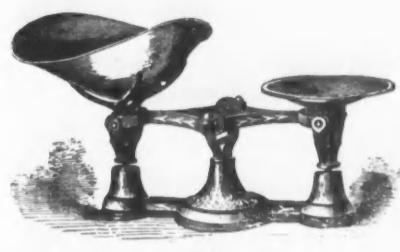
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Fig. 200.



Fig. 70.

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All parts of these Wrenches are warranted. Should any part break it will be made good free of charge on application to the merchant from whom you purchased.

Under the greatest strain the sliding jaw will not yield a hair, but remains as firmly fixed as if welded to the bar.

WRITE FOR CIRCULAR AND PRICE LIST.

**UTILITY WRENCH CO., LIMITED.**

Office: No. 231 E. Ninth St., New York, N.Y., U.S.A. Factory: Hamilton St. &amp; New Jersey R.R. Ave., Newark, N.J., U.S.A.

**BYRAM & COMPANY'S  
STEEL NOSE STORE AND  
WAREHOUSE TRUCKS.**The most serviceable Truck for store, warehouse or rail-  
road use will be found in the Steel Nose Truck manufactured  
exclusively by

BYRAM &amp; COMPANY,

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Correspondence Solicited and Satisfaction Guaranteed.

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MANUFACTURERS OF RIVERSIDE

**STEEL NAILS**

Pig Iron, Bar Iron, Bar Steel, Steel Blooms, Steel Billets,

Small T Hails, Flat Hails of Iron or Steel, Fish Bars of Iron or Steel.

WHEELING, W. VA.

Established in 1839.

**A. G. COES & CO.,**

WORCESTER, MASS.,

MANUFACTURERS OF

A. G. COES'

PATENT

**SCREW WRENCHES,**

The Strongest Wrench made, and the only successful re-enforced bar.

The Ferrule is firmly secured in place by a nut screwed on the bar.

Particular attention is called to the way in which the handle is made and fastened to the shank.

This Handle is made better and stronger than heretofore by using our new Cup Tip at the end which encloses the wood and keeps it from splitting. This is the only wrench which has the wood handle firmly secured and held together at each end, and it will stand more rough usage and last longer than any now made. It is not affected heat, cold or moisture.

None Genuine unless stamped,

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Warehouse:

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and 95 Reade Sts.,  
NEW YORK.

JOHN H. GRAHAM &amp; CO., Agts.

This Wrench can be Furnished  
with Long Nut or Sleeve.**Bemis & Call Hardware & Tool Co.****PATENT COMBINATION WRENCH.**

Case-Hardened Throughout. Parts Interchangeable.

This Wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

**[No. 3 PATENT PIPE WRENCH.]**

The serrated jaw of the Wrench are interchangeable; that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another may be substituted. The slides, nuts and various parts are also interchangeable, thus easily repairing the Wrench at very small expense. It is a valuable article for further use as when the Wrench was new.

For Circulars and Price List, address

**BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.****CANNON'S DIAMOND POINT NAIL SET**

PATENTED MAY 19, 1885.

The Hardware Jobbing Trade will be furnished free with a liberal supply of printed matter of

**Cannon's Diamond Point Nail Set**

by sending their names to the manufacturers.

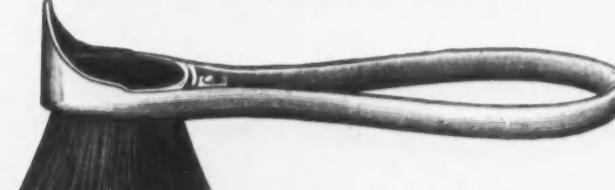
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LIMITED,

POUGHKEEPSIE, N. Y.

**THE ROYAL DAUBER.**

WITH MUD SCRAPER ATTACHED.



Patented April 26, 1887. Others pending.

An entirely new thing in Blacking Brushes, consisting solely of TINNED MALLEABLE IRON and PURE BRISTLES. SOLID, ROUND-FACED, INDESTRUCTIBLE. No several small knots, but ONE SOLID KNOT OF PURE BRISTLES. NO HORSEHAI.

ROUND-FACED.—Takes Blacking from the box on its centre instead of its edges, and will therefore spread it evenly, smoother and thinner, ensuring a better polish than any flat faced brush.

INDESTRUCTIBLE.—Because the odd parts of the brush are all one piece of iron and bristles, put together to stay, the knot of bristles being in ONE SOLID MASS, BY IMPREGNATION, IN A GRIP OF IRON, and fastened with an iron rivet. Warranted not to "spread" or "elbow" with blacking.

WILL OUTLAST A DOZEN OF ANY OTHER KIND.

This DAUBING BRUSH is made WITH A SCRAPER FOR REMOVING MUD FROM THE CREVICES OF THE SHOES. The utility of this is too apparent to need a word of commendation.

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*Superiority acknowledged wherever used, sold or exhibited.*

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MANUFACTURERS OF

THE IMPROVED

Adjustable Queen Anne Screen



This is a new departure in adjustable screens and is free from many objections found in others. It is the only double face screen, and equally well finished on both sides. It has a box panel, and can be adjusted without the friction noticeable in all other adjustable screens. This screen is made either of soft or hard wood, and stained imitation black walnut, cherry, or finished in natural wood, as desired.

Price Lists and Discounts furnished on application to

JOHN H. GRAHAM & CO., Sole Agents,

113 Chambers and 95 Reade Streets, NEW YORK.



This Knife is the BEST IN USE for cutting down hay and straw in mow and stack, cutting fine feed, straw, stalks for feed, cutting peat & ditching marshes. The blade is Blue Cast Steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives. They are nicely packed in boxes, 1 dozen each of 60 pounds weight, suitable for shipping by land or water to any part of the world.

Manufactured only by  
HIRAM HOLT & CO. EAST WILTON, Franklin Co., MAINE.  
For sale by the Hardware trade generally.

#### CAUTION.

We are informed that various parties are infringing upon the widely-known Letters Patent granted originally to GEORGE F. WEYMOUTH for an improved Hay Knife. The invention patented to GEORGE F. WEYMOUTH is embodied in a sword-shaped blade provided with operating handles for working the same, the edge of the sword-blade being furnished with knife-edged serrations or teeth. It is our purpose to PROSECUTE ALL INFRINGEMENTS, and to hold responsible to the full extent of our ability and of the law all parties who manufacture any knife infringing upon the patent, or who deal in the same. Several suits are now pending in the U. S. Courts. All manufacturers and dealers are hereby warned of our rights, and the public are cautioned against purchasing any Hay Knives, made as described above, which are not of our genuine manufacture.

EAST WILTON, Sept. 1, 1886.



W.H. CARTER'S PATENT NEEDLE HAY KNIFE.  
PAT. APR. 29, 1884.  
IMPROVED BY M.M. BARTLETT.  
Improvement Patented April 28, 1885.

SOLE MANUF. OF Carter's Improved NEEDLE HAY KNIFE, THE BEST IN THE WORLD.

Patented April 29, 1884.

Improvement patented April 28, 1885, of which we are the sole manufacturers, has been tested with the most celebrated knives of other makers, and has proved an easier and faster cutter than any other. Its superior excellence consists in the fact that the tool shown in the engraving, can be used for cutting hay in the mow, straw and bale; also for ditching, cutting peat, or any work for which hay is usually used. It can be readily ground by the most inexperienced, as it requires to be ground only on one side. Should a tooth break, all that is necessary to replace the damage is to grind it once and a new chisel-tooth appears. Can ordinarily be sharpened with a common scythe stone. Try one and you will give it the preference.

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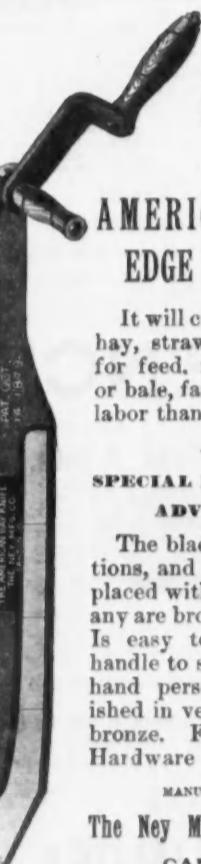


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#### AMERICAN SICKLE EDGE HAY KNIFE.

It will cut loose or packed hay, straw, peavines, etc., for feed, from stack, mow or bale, faster and with less labor than any other knife.

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The blade is made in sections, and can be easily replaced with new sections if any are broken or damaged. Is easy to sharpen; has handle to suit right or left-hand persons; finely finished in vermilion and gold bronze. For sale by the Hardware trade generally.

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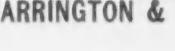
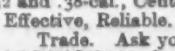
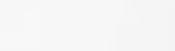
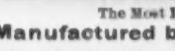
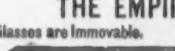
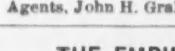
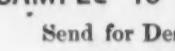
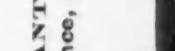
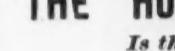
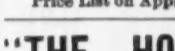
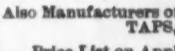
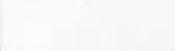
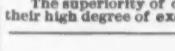
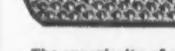
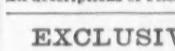
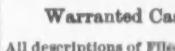
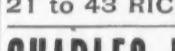
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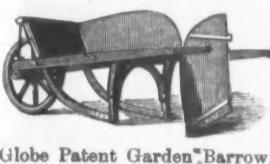
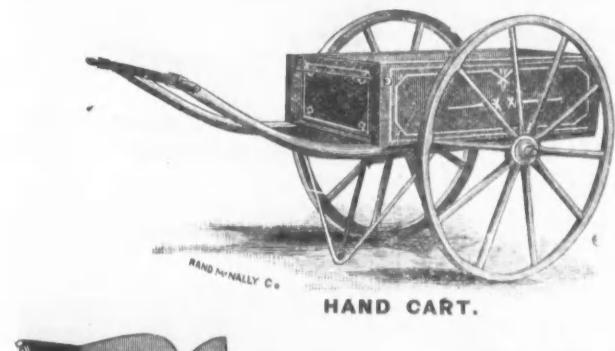
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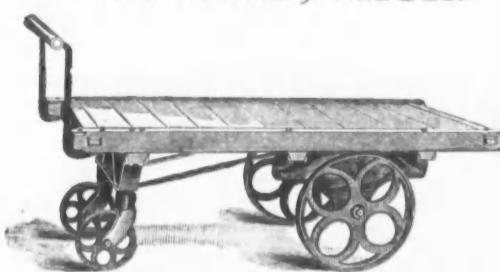


Globe Patent Garden Barrow.



Capitol Patent Bolted Barrow.

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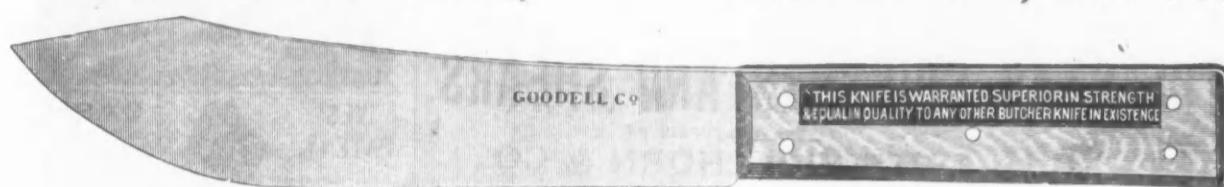
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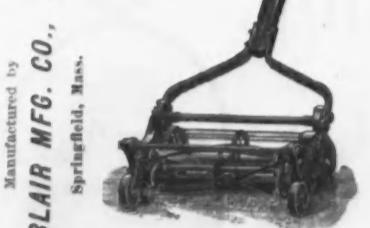
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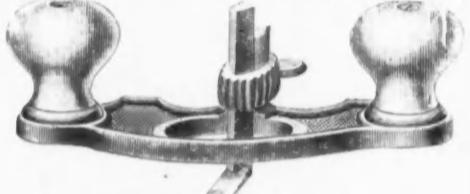
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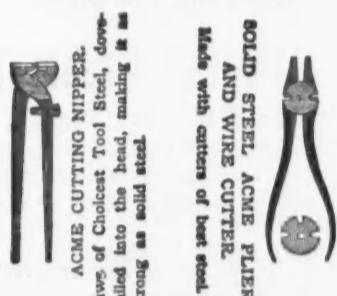
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873	- - -	2 $\frac{1}{2}$ "
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### The Strong Locomotive.

From an interesting lecture on the Strong locomotive delivered last Thursday evening by Mr. Geo. S. Strong before the Society of Arts, at the Massachusetts Institute of Technology, Boston, Mass., we extract the following:

In America the fastest runs are on the New York Central from New York to Buffalo—440 miles in 10 hours 45 minutes, or at the rate of 40.93 miles per hour, with only three stoppages and with favorable grades. On the P. R. R. the limited runs from Jersey City to Pittsburgh, 443 miles, in 11 hours 17 minutes at an average speed of 39.27 miles, with three stoppages. This same road between Jersey City and Washington runs a train the 226.7 miles in five hours two minutes, corresponding to 45.04 miles per hour. The fastest run between any two stopping places is that on the B. & O. between Washington and Baltimore, where a distance of 40 miles is covered in 45 minutes, and this corresponds with the English run between Manchester and Liverpool of 36 miles in 40 minutes. Both these runs are about 53  $\frac{1}{2}$  miles per hour. Other fast English runs are, London and Edinburgh 401 miles in nine hours by the G. N. R., or 44  $\frac{1}{2}$  miles per hour. The same line runs from Manchester to London 205  $\frac{3}{4}$  miles in four hours and ten minutes, at a speed of nearly 49  $\frac{1}{2}$  miles, and only two stoppages are made. Certainly between stops a speed of over 60 miles is often obtained, but an average running speed of 60 miles is nowhere obtained, and all high speeds are usually with quite light trains. The causes of this are not far to seek, and may be found in the boiler and about the valve gear.

First, the boiler. It is by no means impossible with a rectangular fire-box to obtain as large a fire grate as may be desired, but this is done at the expense of safety. The flat-sided box with its multitude of stays is not a scientific form of construction, but one which contains the elements of self-destruction, as the thousands of broken stays constantly testify. Hence, as regards the boiler, there is required some structure providing a larger grate area than hitherto has been safely employed and constructed on recognized safe and scientific principles, and modern practice calls also for higher pressures, and for such high pressure any boiler to be a success must be safely suitable. A flat surface exposed to pressure is the very worst form in which material can be disposed, and stays are thus simply an expedient for holding up to their work surfaces of metal which should not be found in a steam boiler, for in such a surface the stresses are transverse, and a thin plate is as unsuited to resist a transverse stress as is a very shallow truss to carry a great weight. Deflection must take place, and to prevent this, the stays are employed and add very greatly to the weight the boiler as well as to its cost, and, after all, are but an unscientific makeshift. Second, the valve gear. Supposing that a full supply of steam is available from the boiler, it is impossible to obtain the power from the engine which could be obtained from, say, a Corliss engine at equal speed and steam pressure; when at high speed and with steam blowing at the safety valves there appears to be something which holds back the engine. It is not the slipping of the wheels, for it is not found that wheels do slip at high speeds. It is not that the cut-off in the cylinder is too early or too late, for any variation from a certain position of the reverse lever only lessens the speed. The fault is one that is inherent in the common link motion—namely, excessive compression.

Over compression may be remedied somewhat by an increase in the clearance spaces of the cylinder and passages, but such an increase would be wasteful. The fact of the existence of this excessive compression is, however, a bar to any attempt to reduce clearances, and is therefore a fault to be removed. The claim that compression is an aid to economical working is true in a sense, but there is no necessity for an excess in an otherwise good feature. The great evil of excessive compression is the enormous reduction which it makes in the power of the locomotive at high speed. Deprived of perhaps a third or more of its proper tractive power the engine cannot attain a high speed with a heavy load. Quite apart from the question of small consumption of coal per horse-power is the question of the general efficiency of a locomotive. If an engine is sufficiently heavy to start a certain train from rest and draw it at a moderate speed it may have a mean cylinder pressure at late cut off about equal to its adhesion on the rail. At a high speed, however, the adhesion of the engine is very much in excess of the cylinder tractive power, and hence a great amount of useless weight has to be transported. If, however, the cylinder traction be doubled by an improvement in the valve gear we should still at high speeds have a sufficient adhesion to draw double the load, and we should still haul with one engine and two men a load which would pay double freightage for the same wage expenditure. It is apparent, then, that we may lose more by striving after economy of fuel per horse-power than by seeking to increase the attractive power at speed per pound weight of machinery. The question of efficiency per pound weight of motor has been far too little studied, and it will be acknowledged that the engine which secures this efficiency, and does so without loss of economy, is a machine worth some consideration, and such is the Strong locomotive. Various types of valves have been tried with the object of securing better admission and exhaustion of steam, but they do not reduce the compression, which is a fault of the link mechanism rather than of the valve, and balanced valves have been actually known to consume 10 per cent. more steam than plain valves, owing probably to leakage.

To run a heavy train at high speed requires a large power, and this implies a high mean cylinder pressure and a continuous and well sustained steam supply. We will show how they have been obtained in the Strong locomotive. It is scarcely necessary to remark here that in order to properly consume coal there must be provided means for the proper admixture of air with the gases from the fuel, and that, when mixed, time must be allowed for combustion to complete itself. Within the fire box shell are two furnaces, which together give a grate surface about three times that of ordinary locomotives. The large area of grate renders possible a lighter blast, so that the fire is not torn up. A too fierce blast draws unconsumed particles of coal through the tubes and smoke-box, and frequently chokes the tubes and overheats the smoke box, causing the doors to spring and draw cold air. Too strong a draft also may produce bare spots on the grate, which allow the rush of volumes of air, which serves no useful purpose when thus admitted and only causes waste. The further advantage of a gentle blast is the reduction in the back pressure on the piston. Beyond the furnaces is a separate combustion-chamber, in which combustion is completed before the gases are quenched in the small tubes.

The furnaces are of corrugated steel, so as to form a series of compound arches giving immense resistance against a collapsing pressure when rolled into cylinders, and are for all practical purposes indestructible, having been proved capable of resisting a pressure of 1100 pounds per square inch. The furnaces are united by a junction piece or "breches" to the combustion-chamber, also of corrugated steel. The various riveted junctions lying in the path of the flame from the fires are of the form known as the Adamson flanged seam, form which provides that no rivet shall be exposed to the action of fire, so insuring durability and tightness. This form of furnace joint is now almost universal in English boiler practice, and its excellence has stood the test of 30 years. By employing the circular form we are able to dispense with all stays and rid our boiler of the most expensive and least durable portions of the usual practice. In the forward end of the combustion-chamber is fixed the tube plate, beyond which point the general characteristics of the boiler are the same as those of the ordinary locomotive. The tube plate is the only flat portion exposed to external pressure, and as the greater part of its area is occupied by the tubes it may be said that all parts of the furnace, &c., are of the natural circular form which is suited to withstand pressure without the brute resistance of stud and roof bar stays, palm and crowfoot bars, &c., which are necessary to keep the rectangular firebox up to its work. The importance of this can only be recognized by those who can properly appreciate the difference between a cold boiler and one hot and under high steam pressure. In the cold boiler all is dead and motionless. In the hot boiler a constant expansion motion is taking place, which arches up the furnace crown, lengthens one part more than another less highly heated, and generally sets up a completely different set of conditions, which if not provided for, will, from the commencement, begin to effect the destruction of the boiler, from overstraining, grooving, &c. We have in this boiler endeavored to avoid all transverse stress and trusted to the direct tensile and compression strength of the material. Turning to the outer shell, the barrel of the boiler, beyond being like the furnace and combustion-chamber welded at all longitudinal seams, presents no material points of difference from the ordinary boiler, but back of the barrel the difference is very great. In place of the flat-sided fire box shell, with circular top, we have two segmental pieces joined by a stout central or division plate. Each segmental half of this shell acts therefore just as though it were a complete circular shell, for the division plate has, of course, pressure on both sides, and acts by tension only to resist the bursting stress on the cylindrical segments. The welding of the longitudinal seams has been made possible by the introduction of gas for such purposes, which enables us to heat up the welding scars to the proper temperature and preserve their surfaces clear and free from dirt, oxidation or anything which might tend to make the weld less reliable than the rest of the plate. By welding, too, we may have perfectly circular barrels not otherwise obtainable without butt jointing and double covers, and so we avoid any tendency to grooving.

The back head is the only portion, except the tube plate already referred to, that is exposed to pressure and yet flat. As, however, it is chiefly occupied by the furnaces, this is of small account, and a slight gusset stiffening is all that is required as staying, and forms with similar staying of the front tube plate all the staying in the boiler. As now constructed, every part of the boiler may be machine riveted. As regards the valve gear it should be remarked that in place of a single slide-valve, four valves, all alike, are employed for each cylinder—two for steam and two for exhaust. They are of the gridiron or multiport type, and work up and down when in full gear only  $1\frac{1}{4}$  inches vertically. The actuating gear consists for each cylinder of a single eccentric only, to the strap of which are attached the two eccentric rods. One of these for steam valves is rigidly attached to the straps, the other for the exhaust is pinned. Each rod is suspended at a point 8 inches from its extremity by a long link to a block which slides upon a quadrant. Each block may be placed at any desired position on its quadrant by means of the reversing levers, and so decide the point of cut off, and whether the engine shall run forward or backward. The gear is very simple and readily comprehended. It has no working parts other than cylindrical pin-joints, and therefore works with a minimum of wear and tear. The final result of the gear is that boiler pressure is very nearly attained upon the piston. Steam pressure is carried by the piston to the fullest useful extent. Exhaust is quick, and the exhaust valve does not close before the proper time. Hence an indicator card is obtained of the fullest area consistent with proper working, and the power of the engine may always be a maximum for any given cut off. Thus a high speed is always possible, and the difficulties now experienced in connection with excessive compression entirely disappear. We are consequently enabled to obtain a greater tractive force per pound weight of engine, and instead of as now an engine being far too heavy for its work at high speeds we are able to more

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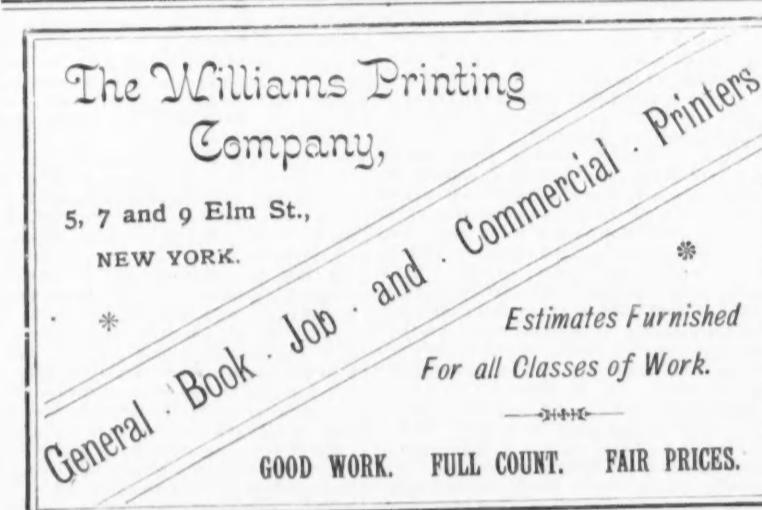
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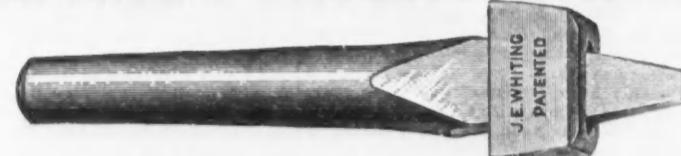
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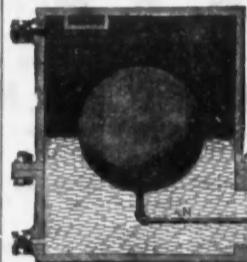
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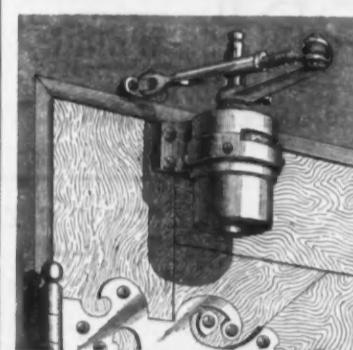


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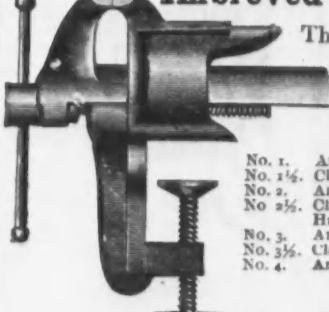
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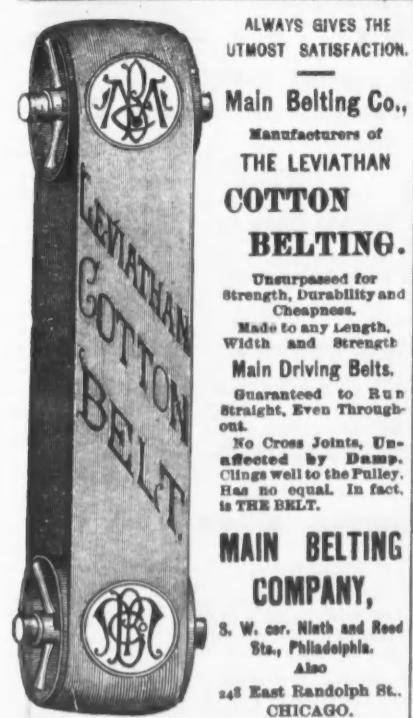
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fully utilize such weight by the conveyance of a greater load at equal expansion.

The seats in which the valves work are turned cylindrical plugs which fit in bored chambers cast in the saddle of the cylinder in place of the usual steam chest. Suitable grooves are cut or milled out in the seats and arranged to fit the valves. In each valve of a 20 x 23 or 19 x 24 inch cylinder are 10 ports, each 4 1/2 long by 3/4 wide. The steam edge is, therefore, 46 1/4 inches long or nearly three times that of an ordinary valve. By this long admission edge the initial cylinder pressure very closely approaches that in the boiler, and the rapid opening of the port and equally rapid closing insure that the initial pressure shall be well maintained and cut-off sharply defined. The same applies to the exhaust also, which may be kept open until just such point as will give a proper, but not excessive, compression. An ordinary locomotive at early cut-off loses about a third of its proper mean effective pressure, from excessive compression, and this necessitates a later cut-off, and, perhaps, a three-fold expansion only, in order to maintain the mean pressure we secure at a six-fold expansion. (We should remark here that Mr. Strong, at this point, showed and discussed a number of indicator diagrams taken from engines with and without his valve gear.)

Much may be learned by a study of indicator cards, and not their least important use is an aid to general design and proportion of parts. Thus if we suppose that 1000 feet per minute is the maximum proper piston speed, and cards generally show this to be a convenient limit, we find, then, that for a speed of 60 miles per hour the proper wheel diameter should be 81 inches, and so similarly for local traffic and maximum speeds of only 40 miles the wheels would be 53 inches diameter. Generally it may be said that wheel diameters are too small in America, and it is an advantage of the Strong valve gear that the addition to the card areas due to the reduction of the compression enables us to obtain an equal tractive force for the same cylinder with larger wheels than in an ordinary type of engine. While we would not advocate the over cylindering of an engine, we would point out that for economical working a cylinder must be of a diameter sufficient to allow of the steam being pretty well expanded. Too frequently engineers will run with half-closed throttle, and in almost full gear, rather than employ the reversing lever for expansive working, and a probable cause of this may be the poor exhaust given by the link motion. With separate exhaust valves, which can be set to full travel at all times, there is no excuse for using the throttle, which must always be thrown wide open, and all regulation effected by expansion only up to six expansions, beyond which further regulation may be made with the exhaust lever. The importance is shown, too, of reducing the general back pressure line down as closely to the atmospheric pressure as possible. To this end it is not merely requisite that the exhaust valve should have its full travel for all grades of expansion, but also that the blast nozzle should be as large as possible, consistent with steam raising, and the larger the fire-box the more gentle may be the blast within reasonable limits.

The highest power ever obtained from a locomotive hitherto has been 1200 horsepower. No. 444 (Strong locomotive) of the Lehigh Valley Railroad, when ran on the Northern Pacific road, on the 24th of June last, pulled 12 cars a distance of 10 1/2 miles in 11 minutes, from a dead stop to a dead stop. The weight of train was 370 tons, exclusive of engine and tender and with a boiler pressure of 160 pounds. Cards taken at a speed of 326 revolutions per minute show no less than 1810 horse-power, an unprecedented result. No. 444 has 6 coupled wheels of 62 inches diameter, carrying 60,000 pounds on the drivers, with 27,000 pounds on a 4-wheeled front truck and 20,000 on a 2-wheeled rear truck. Her total wheel base is 30 1/4 feet, but the rigid base is only 5 feet 7 inches, the leading driver having a 7-inch blank tire, so that with swing motion to both trucks she can pass curves of 200 feet radius. Her grate surface is 62 square feet, and she has 1848 feet of heating surface. With this she makes ample steam from the finest buckwheat coal or screenings to take the heaviest trains up 96-foot grades, and does the work hitherto never done, except by two locomotives. She would haul 20 cars at 60 miles speed on a level and keep it up. For fast work, however, larger wheels than 62 inches are to be preferred.

**Smokeless Powder.**—Many military writers have expressed an earnest desire that smokeless powder, capable of being used in war, should be adopted. The advantages of such a powder are obvious. It is of interest to note, therefore, that a new variety has been brought out in England. This powder, according to the London Times, is named the Johnson-Barland powder, or for short, the J.-B. powder. Last December there was an official trial of this powder at Enfield, and a favorable report was made to the War Office. Both the Martini-Henri and the Martini-Enfield were tried on that occasion with the following results: The Government powder, 85 grains, gave with the Martini-Henri a muzzle velocity of 1314 feet per second; with the J.-B. powder, 60 grains, one of 1520 feet per second. With the Martini-Enfield the Government powder gave a muzzle velocity of 1570 feet per second; with the J.-B. powder one of 1800 feet per second. Trials were recently made with an improved Gardner rifle-caliber machine gun; these showed that the new powder works, with very little sound and very much less fouling than the ordinary powder, supporting the claims made to that extent.

George B. Cowlam, of Louisville, Ky., has published a pamphlet entitled "The Undeveloped South," in which he describes the territory and its resources through which the proposed Nashville and Charleston Railroad is to pass.

The Sprague Electric Railway and Motor Company, of New York, have issued a little pamphlet descriptive of the adaptation of its appliances to mining work.

### New Southern Coke Furnaces.—II.

The Sloane Iron and Steel Company are building TWO FURNACES AT NORTH BIRMINGHAM, the work being done by Messrs. Gordon, Strobel & Laureau, Mr. I. Prosser, superintendent. The furnaces are 75 feet high by 17 feet bosh, to be blown through 6 inch tuyeres. The diameter of the bell is to be 9 feet 6 inches. The diameter of the downcomer is 7 feet; the dust catcher is to be 17 feet high by 11 feet in diameter. The health will be Gordon's improved coils in cast plates, encircled by a wrought-iron jacket with expansive joints, while the boshes will be provided with double shelves of cast iron, within which are water-cooled plates always in contact with the air. The plant is to be equipped with eight Gordon-Whitwell-Cowper hot-blast stoves 17 feet in diameter and 65 feet high to the top of the wrought-iron hearth, the chimney being 45 feet high. Steam to be produced by four double batteries of Babcock & Wilcox water-tube boilers 30 inches in diameter and 18 feet 11 inches long. Four blowing engines, built by Messrs. Edward P. Allis & Co., of Milwaukee, are a part of the plant. They have 40 inch steam cylinder, 84 inch blowing cylinders, with 5 foot stroke. The two draft stacks are 6 feet in diameter in the clear and 110 feet high. The pumping plant will consist of three pumps, with a 30-inch steam cylinder, 14-inch water plunger and 12-inch stroke, coupled to the 15-inch suction pipe. The casthouse will be 50 feet by 150 feet by 25 feet high, while the stockhouse will be 100 feet by 300 feet by 32 feet high. The ironwork of the stoves for No. 1 furnace is about completed, and the brickwork in two of them is nearly two-thirds ready, the ironwork for the furnaces being completed. The boilers are all in position and nearly bricked in. The engine foundation is completed, and work has been begun on the brickwork for the engine beds and the brickwork of the engine-house itself. The foundations for the stoves of No. 2 furnace have been finished, as also the foundations for No. 2 furnace itself. The water tank foundation, 32 feet in diameter and 25 feet high, of solid masonry, is up. On it there will be a tank erected on eight cast-iron columns 32 feet high, the tank being made of 5/8 inch plate, to be 30 feet in diameter and 32 feet high, with a capacity of 172,000 gallons. The foundation of No. 1 casthouse is completed, and upon it will be erected the building, which will be entirely of wrought iron. The stockhouse is about to be started, to be all constructed of wooden posts and wrought iron roof. It will be seen from this description that these furnaces will probably not begin operations until May or June next year.

In *The Iron Age* of November 3 we described in detail the plant of

THE FOUR ENSLEY FURNACES, actively going on in building. No. 4, the principal characteristic of which is the introduction into the Birmingham district of furnaces larger than those used hitherto, viz., 80 feet high by 20 feet bosh. Work is under way at the greatest distance from the engine house is lined, the hot-blast stoves are complete and the downcomer ready. At the time of our visit the bell was being put in. No. 3 furnace is lined to the bosh and it will take two months to complete the lining. The hot-blast stoves for this furnace are ready for the arch. On No. 2 the shell is up and the columns are in place. The ironwork of the hot-blast stove is completed and the brickwork will be begun. On No. 1 the columns are up and work is going on the shell. The ironwork for the stoves is on the ground and everything is ready to begin the foundations for them. The casthouse for this furnace is just being taken in hand. Active work was going on in connection with the shells of the draft stacks. Six of the Weimer engines are in place and the foundations are being put in for the others. Thirty-two boilers are in place. While a great deal of work has been done in a short time, so much still remains that there is no prospect of blowing in any one of the furnaces before spring.

THE TWO WOODSTOCK FURNACES are being built at Anniston by the Woodstock Iron Company. They are being built back to back. Behind each are the three Whitwell stoves, and between them the six batteries of boilers with the single draft stack. In front of the boilers is the engine house, with pump house, while along the whole of the distance from the one end of the casthouse of one furnace to the end of the other furnace extends the stockhouse, with its double track elevated railroad, the furnace being flanked by the houses. The furnaces are being built from the designs of Messrs. Tawa & Hartman, of Philadelphia. They will be 75 feet high, with 16 1/2 foot bosh, 10-foot crucible, blown through eight tuyeres. The Whitwell stoves will be 70 feet by 16 feet 7 inches; the boilers, 18 in all, in six batteries, are 70 feet long by 42 1/2 inches, with heaters 51 feet long by 32 inches. These boilers, made of steel at Anniston, are now ready to go in. The engines, of which there will be five, built by Noble Brothers & Co., of Anniston, will have 36-inch steam cylinders, 50 inch blowing cylinders and 5 foot stroke. The stack will be 23 feet in diameter at the base to a height of 22 feet, and will then be carried up with a diameter of 16 feet to the top, the total height being 165 feet. At the time of our visit the shells of the furnaces were begun, the casting-houses, 144 x 56 feet, were building, the ironwork of the hot-blast stoves was under way, the foundations for the draft stack, boilers and engine house were completed, and work at the stockhouse was under way. The furnaces will probably not blow in before May or June. The Tennessee Coal, Iron and Railroad Company are building

A NEW FURNACE AT SOUTH PITTSBURGH, concerning which Mr. J. Lodge, superintendent, sends us the following details: The furnace is 75 feet high, with 17-foot bosh, 10-foot diameter of bell, to be blown through six tuyeres. It is equipped with three 65 x 18 Whitwell hot-blast stoves, by James F. Withrow, of Pittsburgh, Pa., the dimensions of the casthouse being 50 x 140 feet.

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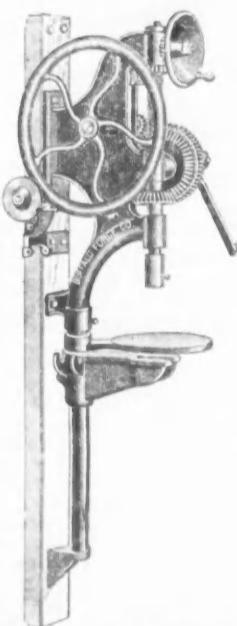
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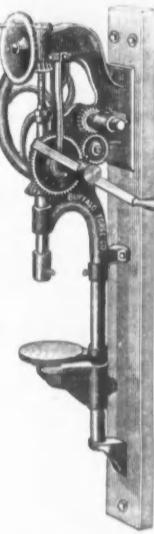
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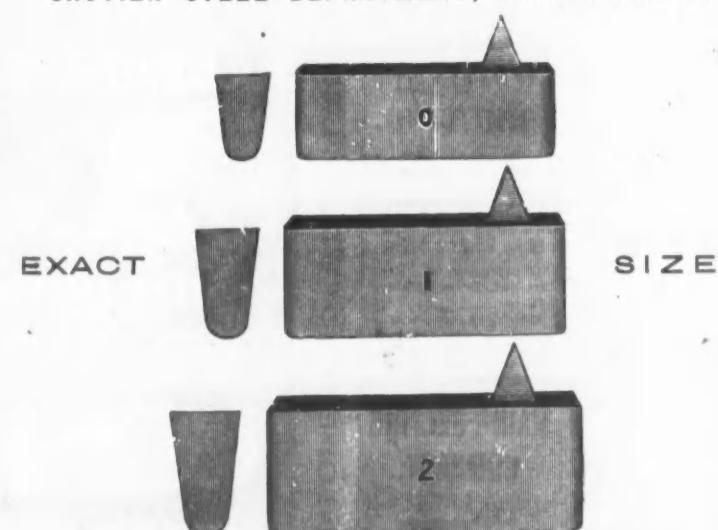
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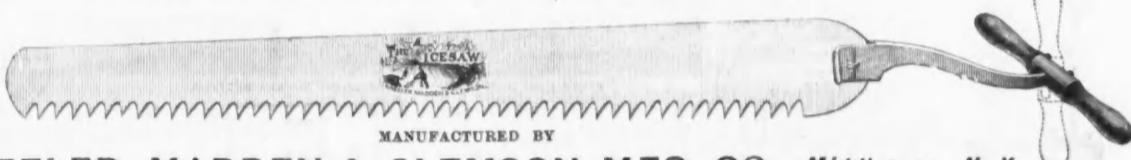


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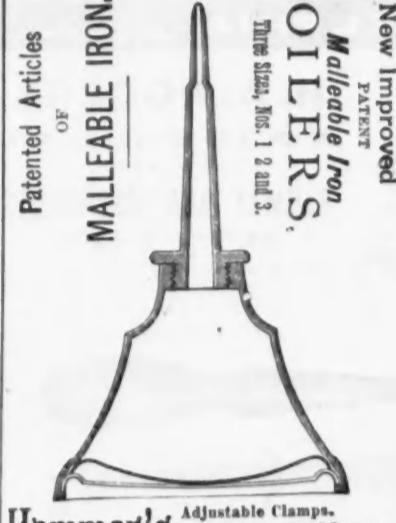
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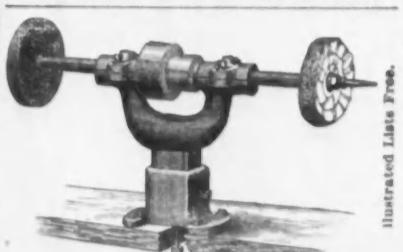


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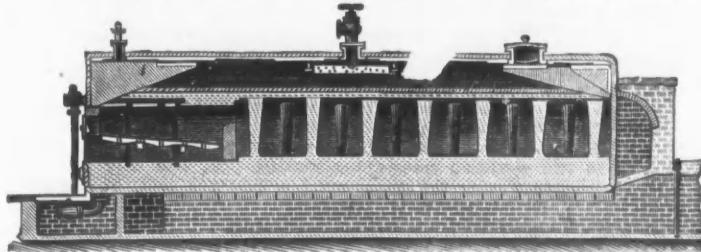
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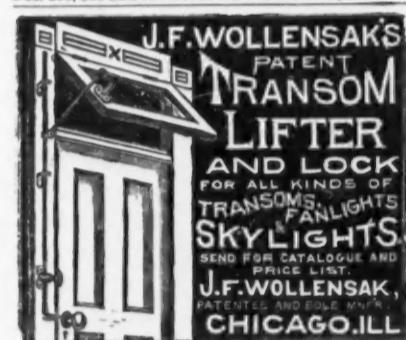
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The furnace will be blown by two engines, built by the Linn Iron Works, of Birmingham, Ala., having 36-inch steam cylinder, 84-inch blowing cylinder and 4 foot stroke. Steam will be furnished by four Babcock & Wilcox boilers, having 7600 square feet heating surface. Nearly all the work in connection with this furnace is completed, with the exception of the lining of the furnace and the erection of the engines. It is expected that it will be blown in about the 1st of February, 1888.

The furnace furthest advanced toward completion is that of

THE SHEFFIELD FURNACE COMPANY,

at Sheffield, Ala. The plant consists of one furnace, 75 feet high by 17 feet bosh, the diameter of the crucible being 9 feet and that of the bell 8 feet 6 inches, the furnace being blown through 8 tuyeres. Back of the furnace are the three hot-blast stoves, and back of them, extending in direction at right angles to the center line of the cast house, is the stockhouse. To the right, parallel with the casthouse, are the boilers, and back of them the engine-house. The plant was designed by James P. Witherow, of Pittsburgh. It is equipped with three improved Whitwell hot-blast stoves, 18 feet in diameter and go feet high. The diameter of the down comer is 6 feet, equipped with a 12-foot dust catcher, 18 feet high. There are two Dickson engines, having a 36 inch steam cylinder and 84-inch blowing cylinder, with 4 foot stroke. Steam is furnished by 6 Heine boilers in three batteries  $17\frac{1}{2} \times 12\frac{1}{4}$  feet, the draft stack being 160 feet high by 8 feet in diameter in the clear. The stockhouse is 75 feet by 150 feet, the stock being raised by an Otis hoist. It is estimated that the daily capacity of the furnace will range between 110 and 125 tons, and it is expected that it will be in blast by about the 20th of December. Early in this month all the work was completed except the pipe connections for steam and water. It is reported that the furnace will be blown on Pocahontas coke, 1300 cars of which have been contracted for at \$5.10 a ton.

The PULASKI IRON COMPANY have built one furnace at Pulaski City, Va., Mr. A. J. Dull, of Harrisburg, Pa., being president and Mr. A. S. Patterson, of Philadelphia, secretary and treasurer. Mr. John S. Kennedy, who was for eight years connected with the Pennsylvania Steel Company, at Steelton, Pa., is general manager. Ground for the foundation of this furnace was broken April 8, and it is expected that it will be blown in or about January 20. The plant was from the design of James P. Witherow, of Pittsburgh, the furnace to be 75 feet high by 17 feet diameter of bosh, and 9 $\frac{1}{2}$  feet diameter of bell, blown through eight tuyeres. The furnace is equipped with three improved Witherow-Whitwell hot-blast stoves, 20 feet in diameter and 60 feet high. Blast is furnished by two Dickson engines, having a 42-inch steam cylinder and 84-inch blowing cylinder and 4 foot stroke. Steam is made in four Heine water tube boilers; the casthouse is 180 x 60 feet, and the draft stack 180 feet high by 10 feet in diameter in the clear. It is expected that the furnace will produce from 850 to 900 tons per week, the principal ore supply to come from the Cripple Creek region, although extensive contracts have been made for the Potsdam ores on the main line of the Norfolk and Western Railroad. The company own extensive mineral properties in the Cripple Creek region. The coke supply will come from the well-known Pocahontas region. Early in the month the company were already at work filling their stockhouse with ores.

The OSBORN MFG. CO. 79 TRADE MARK 79 BLEECKER ST. NEW YORK. The Original Inventors and Manufacturers of the "OSBORN" Bright Metal Cages, in Brass, Bronze and Silver Plate.

At St. John's Colliery, Normanton, England, a set of pumps is now being worked by an electric motor which receives its current from a dynamo on the surface. The pumps deliver 39 gallons per minute to a head of 530 feet—that is, they exert a net power of 6.3 horses. The total efficiency of the entire system, including engine, dynamo, leads, motor, gearing and pump is 44.4 per cent., the indicated horse power being 14.2, and the net work performed, as stated above, being 6.3 horse power. Of the indicated horse-power, 7.9 horse-power are, according to the annexed table supplied to Engineering by Messrs. Immisch & Co., of London, N. W., the makers of the electrical plant, expended in the following manner:

Mine Pumps Driven by Electricity.

	Horse-power
Driving engine and dynamo empty	0.88
Overcoming resistance of leads	2.8
Driving motor and first motion shaft	2.0
Driving pumps empty	0.32
Other losses	
Total	7.90

The pumps, gearing and engines were part of the colliery plant, and the motor was geared to the first motion shaft of the pumps by a cotton belt. It will be seen that only a small part of the loss in transmission can be ascribed to the electric plant. The friction of the engine, gearing and pumps would not be less with the pneumatic system of transmission, while with the hydraulic system the power required to lift the power water again to the surface would not be less than that now lost in the friction of the gear. The experiment has been so satisfactory that the colliery owners have given Messrs. Immisch an order for a dynamo and motor to deliver 120 gallons of water a minute to a height of 900 feet.

Beton Forts—It is known, remarks the *Revue Scientifique*, that the new fortifications at Antwerp have been built on new plans, adopted for the purpose of meeting the progress of modern artillery, and especially to provide against the use of the improved projectiles. The explosion of shells of the latest patterns is very destructive to masonry walls, as was shown at Cummingsdorf and the fort of Malmaison. Accordingly engineers have been led to substitute beton or concrete for brick or stone masonry in those parts of a fortification which are exposed to the fire of siege guns. At the fort of Schooten, which is part of the advanced line of defense at Antwerp, all the casemates are of beton. These casemates are 3 m. in thickness at the crown of the arch, and it is believed that they will be strong

enough to withstand the effect of any fire. It may be noted that the extreme precision and the long range of modern siege guns have made it necessary to abandon almost entirely the defense of forts by guns en barbette or in the open air. For this reason all the heavy guns are now covered or placed in casemate, and for defense against assault smaller rapid firing guns and machine-guns or mitrailleuses are provided.

## NEW PUBLICATIONS.

ROPP'S COMMERCIAL CALCULATOR. A practical arithmetic for practical purposes; 128 pages; pocket size. C. Ropp, Jr., author and publisher, Bloomington, Ill.

This is a very useful book for business men and all who desire to have at hand simple, short and very convenient methods of rapid calculation. It is a complete arithmetic in its comprehensive presentation of commercial tables, while it embraces many original methods of performing complicated mathematical computations, as well as proving the correctness of work already done. The advance and discount tables and accompanying methods of manipulating trade discounts, are particularly interesting and valuable. It is bound in three styles—cloth, 50 cents; American Russia leather, \$1, and Russia calf, gilt edges, \$1.50. Must

STEAM BOILER EXPLOSIONS. By Robert H. Thurston. Size, 5 x 7 $\frac{1}{2}$  inches; 173 pages. Published by John Wiley & Sons. Price, \$1.50.

With the exception of the attention given to steam boiler explosions by the technical press and a few stray papers on the subject read before some of the engineering societies, very little has of late years been done in the way of arranging the results of accumulated experience and experimental investigation in convenient and readily accessible form. It was with some interest, therefore, that we took up Professor Thurston's little treatise, in which the subject is considered from both theoretical and practical points of view, and were agreeably disappointed in finding it so much more complete and practically valuable than we had expected. Professor Thurston explains the origin of the book by the circumstance that in the year 1872 he was requested by the Secretary of the Treasury of the United States to prepare for the use of the Treasury Department a report on the causes and the conditions leading to boiler explosions, and began the preparation of such a report, in which he proposed to incorporate the facts presented in the treatise. A series of interruptions, however, prevented its completion at that time, and the subject has therefore been presented in the book before us.

Professor Thurston's first step naturally was an examination of the conditions under which energy is stored in steam and water, and the magnitude of the forces and energies latent in them when confined under high pressure. A series of formulas is accordingly given by means of which these energies may be readily calculated, being the results of the late Professor Rankine's investigations. A table is also attached, having been worked out under the supervision of the author, in which are given the magnitudes of the quantities of energy residing in available form in both steam and water for pressures ranging from 20 pounds per square inch up to 100,000 pounds. Still another table gives the weights of steam and of water contained in each of the more common forms of boilers, the total and relative amounts of energy confined in each under every day conditions of working, and their relative destructive powers in case of explosion. The figures, we need perhaps scarcely remark, are highly instructive and interesting, and show quantities of stored energy much beyond ordinary conception. Further on we find data relative to the energy stored in the steam space alone of boilers, showing that it forms but a small and unimportant fraction of the total energy. As regards the causes of boiler explosions, Professor Thurston agrees with all recent authorities in attributing them, almost without exception, to defective design, malconstruction, decay with time or in consequence of lack of care in preservation, and mismanagement. A statistical compilation of boiler explosions, which is given in connection with this, supplies a list of explosions in this country during the year 1885, and a table of comparative figures for the United States and Great Britain. Theories and methods of explosions due to other causes than simple increase of steam pressure or decrease in strength of boiler are next taken up. Clark and Colburn's water hammer theory is presented, and Lawson's well-known experiments and suggested remedies are reviewed. Following this are a number of pages given up to the subjects of energy stored in heated metal and superheated water; the effects of low water and sediment and incrustation, and the spheroidal state of water. A short chapter is devoted to the relative safety of the various types of boilers. Defective designs and construction and general and local decay are treated of at some length, with a number of interesting illustrations. A chapter on the management of steam boilers is full of valuable practical suggestions and could be studied with a good deal of profit by boiler attendants. From this the author passes on to a consideration of the results of explosions, in which he embodies a number of illustrations of exploded boilers and discusses some of the defects of design shown by them.

The concluding portion of the book deals with experimental investigations of causes and methods of boiler explosions which have been attempted from time to time. Special prominence is there given to a series of experiments proposed by a committee of the Franklin Institute and those projected and conducted some years ago at Sandy Hook by Mr. Francis B. Stevens. The conclusions derived from these are presented in a concise form, and fittingly close a volume which engineers generally can be assured of reading with a good deal of interest and profit.

The Pacific whaling fleet all arrived home in November, with the greatest catch of oil and bone on record.

**Universal Boring, Drilling and Milling Machine.**

(Concluded from page 1.)

The distance between the saddle and outside bearing is 5 feet 6 inches.

In front of the column A is located the driving cone for operating the boring spindle. This cone has six steps for a 4-inch belt, and is provided with a double set of back gears, giving 18 changes of feed to the spindle. The arrangement of the back gears will be readily understood from Fig. 4. The wheels F and F' are capable of being moved along one end of the spindle D so as to throw the former out of gear with its corresponding wheel on the main driving spindle, and bring the latter into gear with the wheel E, or vice versa, as desired. Both wheels, F and F', are secured on the spindle D by a feather. The boring spindle G is made of hammered steel 4½ inches diameter, and has a feed of traverse of 48 inches. Twelve changes of feed by power are provided, ranging from  $\frac{1}{10}$  to  $\frac{1}{4}$  inch per revolution of spindle. The speed, power and feed obtainable are sufficient for any diameter of bore from 1 inch to 24 inches. The spindle moves in a hollow sleeve by

from which finally motion is transmitted to the pulleys V', Fig. 3. The spindle carrying these has attached to it a pinion, gearing with the spur-wheel W, and the latter is mounted on a short shaft carrying a worm, W'. This worm gears with the worm-wheel X (Fig. 4), which by means of a friction feed, Z (Fig. 3), can be made to impart motion to a small spur-wheel gearing into the rack which is cut on the under side of the sleeve in which the boring spindle G is carried. When the power feed is not in gear, the boring spindle can be readily moved forward or backward by turning either of the hand-wheels Y or Y', the former, as shown in the plan, being arranged to work through a set of bevel pinions, a sliding clutch, f, also being interposed for throwing this particular wheel in and out of gear. The right-hand end of the spindle G, as both elevation and plan show, is provided with a number of thrust rings and a nut, great care having been taken in disposing of the strain at this point.

The horizontal travel of the table and the vertical movement of the saddles carrying the spindle G, as previously intimated, have speeds of 1 inch, 6 inches or 6 feet per minute as required for adjusting the work

work the sliding clutches, Q O. These clutches operate on the same principle as the clutch d' already referred to, the several bevel pinions driven by them being mounted on sleeves furnished with clutch teeth, and turning loosely on the shaft N. The screw S, which moves the work-table, is operated indirectly through a pair of spur gears, the whole arrangement, we think, being made perfectly clear by the plan.

The shaft Z drives two elevating screws B B (Fig. 3) in the columns moving the saddles with the spindle G and boring bar G'. For a middle speed, 6 inches per minute, the spring lever K is again moved to its proper notch. The clutch x will then remain out, the clutch d' will move out of e into d, and the shaft N will be driven by the pulley P through the gears b, b', C, c', d, the clutch d', and its shaft and the end bevels near R. The gears a, a', e' and e meanwhile run idle. For a speed of 6 feet per minute, move the lever K to the high-speed notch, then the clutch d' will take the position shown; the clutch x will move into a and the shaft N will be driven by the pulley P through a, the clutch x and its shaft and the end bevels near R, the gears a', b, b', c, c', e' and e now running idle. It will be readily seen that all operations and movements are

is an increase of 1232 tons on their output for October. The blooming mill rolled 39,608 blooms, weighing 22,764 tons, which is an increase of 1209 tons on October. The rail mill rolled 76,841 rails, weighing 20,398 tons, or an average of 425 tons per turn on 48 turns. In October this mill rolled 19,690 tons of rails, which was an average of 419 tons per turn on 47 turns. Of the rails made in November, 70,656 were rolled direct from the soaking pits, and only 6185 were reheated, or 8.05 per cent. of the total production.

**The Coke Situation.**

A meeting of the Western Coke Consumers' Association was held in the Monongahela House, Pittsburgh, on Wednesday, the 7th inst. The object of the meeting was to devise some means of securing a reduction in the price of coke, and also a reduction in rates of freight. The members of the association claim that the present high price of coke, together with the high rates of freight, has made the manufacture of pig iron a very unprofitable business, and that two furnaces in the Shenango Valley and two in the Wheeling district were recently compelled to close down, as they were un-

able to immediately adjust the association would appoint a competent agent and pool their own coke. J. W. Moore, one of the largest independent operators in the region, was present at the meeting, and announced that his firm and that of J. W. Rainey & Co. would, in the event mentioned, join the Coke Producers' Association. If carried out the new association will be able to put 204 cars daily on the market more than any single company now in operation. It is claimed that the shipments for the month of November show that the distribution of cars has been greatly in favor of the syndicate, and were as follows: Frick & Co., 7768 cars, an average of over 2 cars per oven; McClure & Co., 2782 cars, or 1½ per oven; C. C. & I. Co., 1339, over 1½ cars per oven; J. M. Schoonmaker & Co., 3000, or over 2½ cars per oven, while the Producers shipped 1612 cars, or an average of 1½ cars per oven. The total shipments in the region for November were 24,000 cars, against 25,700 for October and 28,701 in September. Of this output the coke syndicate shipped 17,500 cars, the Producers and the furnace ovens, 6500. The average daily shipments were 950 cars, which is below the minimum capacity of the region and the actual requirements of the furnaces by at least 200 cars.

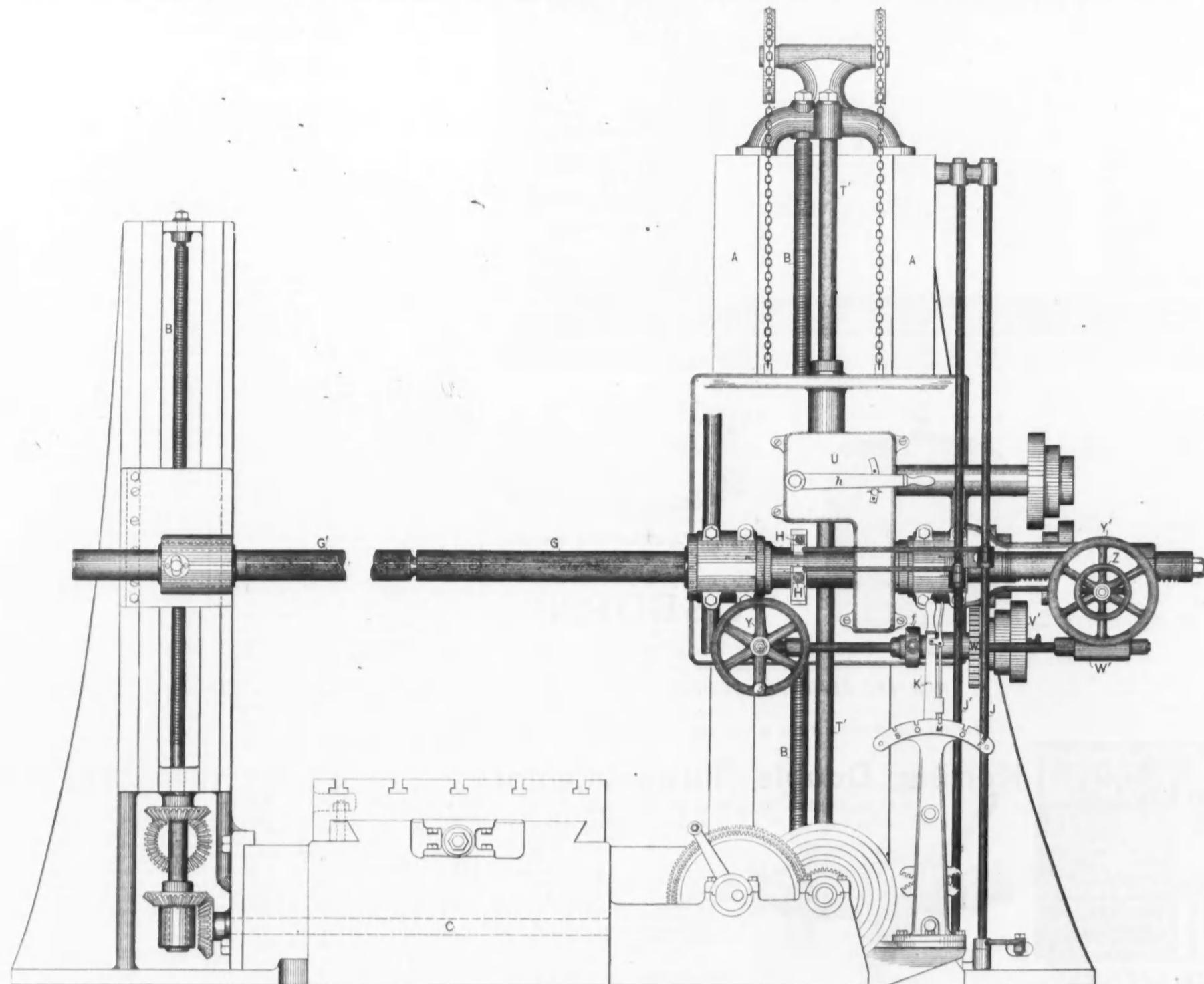


Fig. 3.—Front Elevation.

UNIVERSAL BORING, DRILLING AND MILLING MACHINE, BUILT BY THE NILES TOOL WORKS, HAMILTON, OHIO.

which it is driven, and the latter revolves in bearings, provided with brass bushes, with conical take up for wear. Behind the column A is located the pulley P (see Fig. 4) driving the gear for adjusting the table and saddle. Three speeds for adjustment are provided, slow—1 inch per minute; medium—6 inches per minute; fast—72 inches per minute, being the same for the saddle and the table. By means of a hand lever, K, conveniently placed in front of the column near the driving cone, the change from any one of the above speeds to the other can be instantly made.

Perhaps the best idea of the nature of the different motions and the purposes which they serve will be obtained by beginning with the main driving spindle T, and taking up the various parts one by one following out their functions. The spindle T then transmits motion, by means of a bevel gear, as shown in Fig. 1, to a vertical shaft, T', Fig. 3. The latter carries within the casing U two other bevel gears which, through a sliding clutch arrangement worked by the lever h, can be thrown in and out of gear with a third bevel wheel mounted on a horizontal shaft. On this shaft (marked V in Fig. 4), which on its extreme right hand end carries a set of cone pulleys, is in turn mounted a small spur-wheel gearing with a larger one, the latter imparting rotary motion to the boring spindle G. The spindle, it will of course be understood, can be revolved in either direction by changing the position of the clutch handle h. The cone pulleys on the shaft V, Fig. 4, are belted together, as they are superimposed one upon the other,

to the spindle or the spindle to the work. These speeds are governed by the spring lever and notched quadrant K, in the following manner: In back of the main column A, of the machine is a double cam, M (Fig. 4) which can be revolved by the lever K, shaft K' and the bevel gears and spindle L. The cam M gives reciprocating motion to two connecting rods and m' working in sliding clutches x and d'. The pulley P is driven by an overhead countershaft, and carries with it the pinions a and b. The pulley P and all the gears a, b, b', C and c', &c., run loose on their respective shafts. The gears a and e' and the clutches d' and x are, on the other hand, feathered to their shafts.

The operation is as follows: For slow speeds, move the lever K to the proper notch, indicated by the letters in Fig. 3. The cam M will then throw the clutch d' into the bevel e (the latter being mounted on a sleeve which is furnished internally with teeth to mesh with those of the clutch), and the shaft N will be driven by the pulley P through the gears a and a', the worm and worm-wheel shown, the gears e' and e, the clutch d' and its shaft and the bevel wheels near R, and so impart slow motion to either the screw S or to the shaft Z, or to both, and in either direction, as may be determined by the levers H and H'. It will be observed that these levers govern two rods, Q and Q', through the intervention of the vertical shafts J and J', and a series of bell cranks. The rods Q and Q' pass to the rear of the machine and through two other rods, only one of which, R, can be readily seen, as they are superimposed one upon the other,

under full control of the operator from one position, and that at the front of the main pillar A.

The machine was built with a view to standing hard work, and is a tool of splendid design and perfect work. It is of great strength and power, and has probably a greater range than any tool ever designed for similar work. In all respects it may be regarded as a triumph of mechanical skill. For general purposes in large engine works and shipyards, a modification of this tool is built. Its construction is the same as that of the one we have described, except that the table or platen of the machine is stationary and the column upright traverses to and fro on the bed. In other words, the column carrying the spindle is moved up to the work, the latter remaining stationary. For heavy boring, drilling and milling the machine has superior advantages, and such work can be accomplished at a great saving of labor.

Machines of this kind have recently been built for the shipyards of the Wm. Cramp & Sons' Ship and Engine Building Company, and for Messrs. Gordon, Strobel & Laureau, metallurgical engineers, both of Philadelphia, Pa.

The Union Steel Company, of Chicago, have supplied us with a report of their production for the month of November, which surpasses all previous records of production by this or any other company. With two converters only they made during the month 2497 blows, producing 19,900 Bessemer steel ingots, weighing 24,393 gross tons, which

able to secure even cost for pig iron manufactured. J. J. Spearman, of the Spearman Iron Company, of Sharon, Pa., acted as chairman of the meeting, and Robert Bentley, of the Ohio Iron and Steel Company, of Lowellville, Ohio, acted as secretary. After a full discussion of the question was had by the members present, it was resolved to appoint a committee to confer with the coke operators and the railroads, and endeavor to secure a reduction in the price of coke and also in railroad rates, the committee to report to the association at a meeting to be held at an early day. The following named gentlemen were appointed on the committee: Aaron Wilcox, St. Louis; Henry O. Connell, Youngstown; J. J. Spearman, Sharon; Frank J. Herne, S. H. Hubbard, of Wheeling; and John Z. Spear and Major Morhead, of Pittsburgh.

Another meeting of the Coke Producers' Association was held at the Yough House, at Connellsville, Pa., on Thursday, the 8th inst., with the object of compelling the syndicate to adopt some means of bettering the situation of affairs in the Connellsville region. During the progress of the meeting it was developed that the distribution of cars has grown no better than it was a month ago, notwithstanding the notice served upon the syndicate that damages would be demanded for all losses sustained through a failure to run the works to full capacity. A committee was empowered to employ an attorney to give advice and to determine the extent of damage caused by the breach of contract on the part of the syndicate. It was also decided that if the matter

Pittsburgh got its full quota, but the Western furnaces were compelled to share the shortage to the extent of 150 cars daily. The loss of the remaining 100 cars fell upon the furnaces in the East and the foundries. Though the foundry trade is quite profitable, the shippers have almost entirely abandoned it in order to keep the furnaces running.

After the meeting had adjourned, a member of the Coke Producers' Association who was present made the following statement, and as it probably voices the sentiments of every member of the association we publish it. He said: "We have waited long enough for a solution of this question. We are growing tired of seeing the syndicate make and ship coke in large quantities and not run more than half full, while there exists a contract which plainly says that the cars shall be distributed in proportion to the number of ovens fired. It is only a matter of time with us. If the difficulty is not remedied we will do as we agreed to-day—namely, to open an office in Pittsburgh and sell our own coke. If we do that we will represent 2200 ovens, or 264 cars per day. Schoonmaker has 1266 ovens, McClure & Co. 1500 and Connellsville Coke and Iron Company only 1000. We have renewed our pledges to stand firm, and we mean strictly business."

The last issue of the *Journal of the Franklin Institute* contains the full text of a lecture on "The Crucibles of Blast Furnaces," delivered by Mr. John M. Hartman, of Philadelphia, from the stand point of the practical founder. It is an able effort, which pig

iron manufacturers will read with interest, though they may disagree with Mr. Hartman in some of the points he discusses.

Col. R. T. Auchmuty, the founder of the New York Trade Schools, in a paper read before the American Institute, presented the subject of "An American Apprentice System." The old system of apprenticeship, he

enter a trade. The schools do not graduate journeymen, but apprentices. There should be a trade school in every town, and the result would in a short time place the American artisan at the head of his profession. The combination of the trade school with the workshop he looked to as one of the solutions of the labor problem. It is the unwillingness, Colonel Auchmuty said, of

**Steel for Shells and Armor Plates.**—A trial of shells manufactured by the Compagnie des Forges de Châtillon et Compagnie, made lately at the fort of Gâvres, gave the best results yet obtained. The shell pierced a 15 $\frac{1}{4}$  inch plate of Creusot manufacture. When subsequently picked up in the sea, 5000 feet beyond, it had undergone no appreciable deformation. M.

It is a simple process by which steel may be welded. The specification forming a part of the letters patent relates that Mr. Middleton has discovered "that pieces of steel may, at the proper welding heat, be perfectly, cheaply and easily welded together after the pieces to be welded have been coated with a solution of silicate of soda or other solution in which silica is contained." He continues:

stances in a dry and powdered form, but his patent covers the use of silicate of soda or other silicates as a solution in any manner that may be desired. From time to time in the past few years there have been announcements of the discovery of methods of welding steel, but depending chiefly upon the application of some dry substance they have proved of little practical value. Under

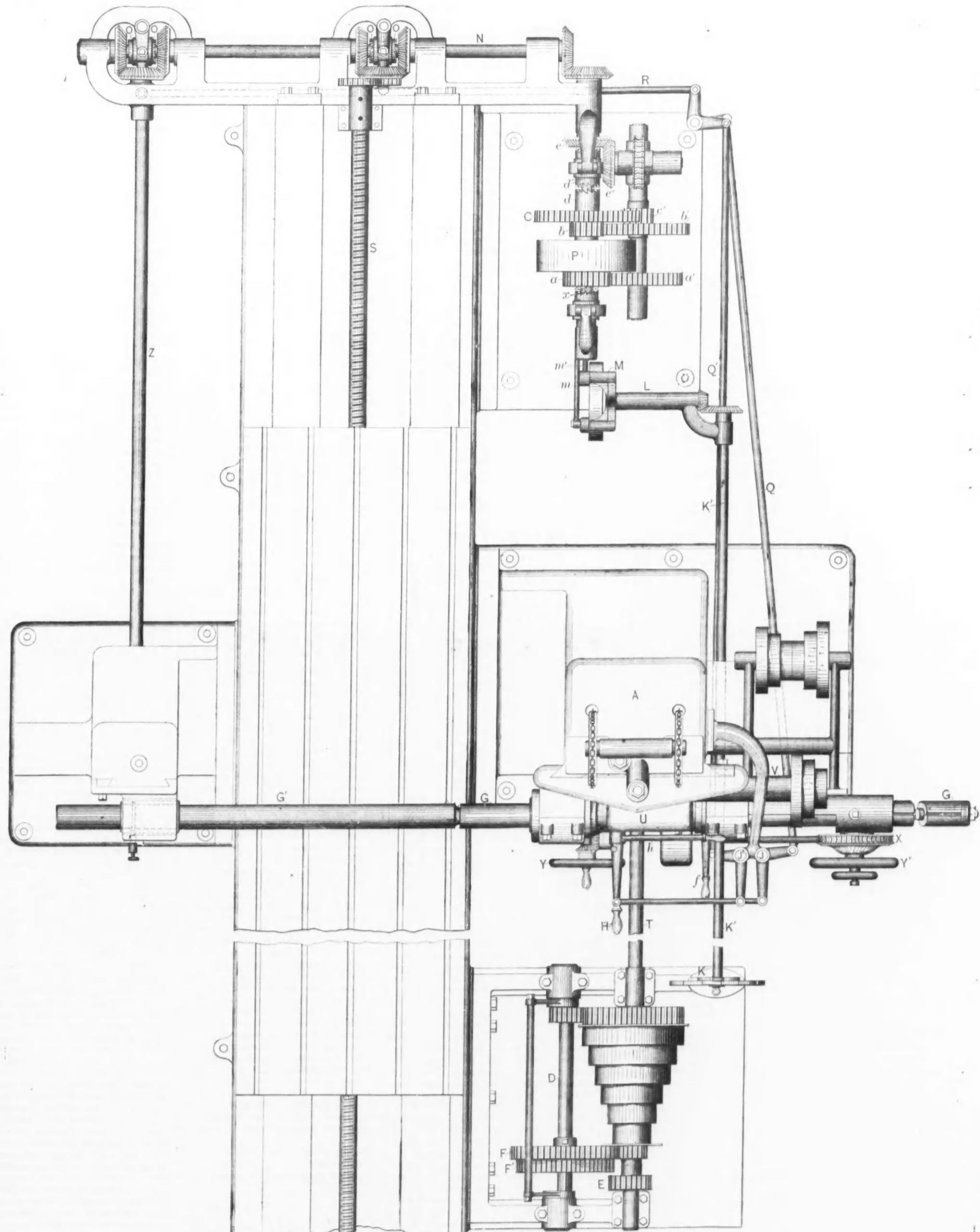


Fig. 4.—Plan.

UNIVERSAL BORING, DRILLING AND MILLING MACHINE, BUILT BY THE NILES TOOL WORKS, HAMILTON, OHIO.

said, had died a natural death. It required the supervision of a master and surrender of independence on the part of the lad. Today the master of a large shop has no time to give his attention to an apprentice, and the lad has to pick up his knowledge by observation and as best he can; a change of fashion or an improvement of machinery may render his skill useless. The trade school can teach what the shop does not. Work in the schools, like the study in a business college, is intended to fit a man to

the master mechanics and journeymen in trades to permit young men to learn trades, lest they should become rivals, that stands in the way of trade schools. This works a great hardship to young men. Take one trade, for example, that of bricklaying. The trades organizations in this city will not permit over 85 young men to learn in one year the bricklaying trade as apprentices. It is a question, Colonel Auchmuty added, whether young men should have a chance to make a living.

Alfred Evrard, who some time ago introduced the manufacture of armor steel at the Firming Steel Works, has, it appears, improved his system of late. He claims to be able to make armor plates which no shell can pierce.

**The Middleton Steel Welding Process.**—Mr. William Buller Middleton, manager of the Penn Iron Works, has been at work for some time testing a metallurgical discovery which promises to prove of value.

"In the practice of my invention I have obtained highly satisfactory results by applying a solution of silicate of soda to the pieces of steel to be welded by dipping said pieces in said solution, or by pouring it upon them, bunching together the pieces to be welded and heating them to an ordinary welding heat and then passing them through welding rolls of ordinary and well-known construction." The patentee declares that he makes no claim to the various proposed methods of welding steel with silica and other sub-

Mr. Middleton's invention, the masses of steel to be reworked can be dipped in a large bath of solution of silicate of soda, or other silicate, placed in the heating furnace, and when at the proper heat withdrawn and passed through the rolls.

China is credited with good statesmanship in acknowledging the independence of Korea. The latter having refused to forward an annual tribute to China, recognition was cheaper than a declaration of hostilities.

# The Iron Age

AND METALLURGICAL REVIEW.

New York, Thursday, December 15, 1887.

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## "Vicious, Inequitable and Illogical."

A document as dignified and important as a message addressed to Congress by the President of the United States, should not be hastily judged. Newspaper generalizations, based upon a hasty and superficial reading, are apt to do such a document injustice. Presumably, it is the result of careful study and preparation. It is at least entitled to a thoughtful reading. For this reason we have postponed for a week its editorial discussion. What we now have to say about it is the result of as careful consideration as the document is entitled to.

We respect an honest and intelligent advocate of free trade. Some men are so constituted that they cannot but accept abstractions as economic truths. From a theoretical standpoint, a great deal may be said in favor of the absolute freedom of international exchanges of commodities. We are willing to listen respectfully to a presentation of these views, and to arguments in support of them. We also recognize the right of those who have given the subject thoughtful attention, to oppose the principle of protection to domestic industry, and to advocate making our markets free, even while those of the rest of the world are more or less effectively closed by duties for revenue or protection. But when the President of the United States, in an official communication to the Senate and House of Representatives, ventures to characterize as "vicious, inequitable and illogical" a principle which for more than a quarter of a century has been embodied in our economic legislation—a system under which the country has experienced a manufacturing development that has silenced prophecy and confused statistics, which more than half the American people believe in and are prepared to sustain against all attacks from citizens or aliens—he forfeits the right to a respectful consideration for what he has to say. Unfortu-

nately, a document of this character cannot be dismissed as one would throw into the waste-basket a pamphlet by some intemperate writer who seeks to strengthen a bad cause by reckless and indefensible attack upon that which has been proven good by long experience. Whatever its tone or its value as a contribution to economic literature, it is the President's message, voicing the plan and purpose of the party of the Administration, and likely to exert a great influence, not only in shaping legislation this winter, but in deciding the next Presidential election. How mischievous its influence may be cannot well be judged so soon; but if it accomplishes nothing worse, it will have a depressing influence upon most of the great industries contributing to the national wealth and discourage large enterprises of internal improvement.

Those who have read the President's message do not need to be told that it is characterized by the nascent zeal of one who suddenly becomes interested in a question which he has previously known very little about. It would seem to be in bad taste for a President to attempt to instruct Congress in the elements of political economy when he is obviously ignorant of them himself. What he says about the surplus, being based upon Treasury statements, is no doubt true, and all classes of the people would approve a strong recommendation that the revenues be reduced to the requirements of a wise, prudent and liberal administration. The people were also prepared for a recommendation that the tariff be revised and that considerable additions be made to the free list. All this, and more, the President might have said with propriety. Indeed, he might have urged Congress to concede the propriety of abandoning the principle of protection to domestic industry and making trade as free as that of other countries offering us commercial reciprocity. It was, however, wholly unnecessary for the President to support his position by an argument which would be severely handled if presented in a college debating club. The following quotation will serve for illustration:

These laws, as their primary and plain effect, raise the price to consumers of all articles imported and subject to duty by precisely the sum paid for such duties. Thus the amount of the duty measures the tax paid by those who purchase for use these imported articles. Many of these things, however, are raised or manufactured in our own country, and the duties now levied upon foreign goods and products are called protection to these home manufactures, because they render it possible for those of our people who are manufacturers to make these taxed articles and sell them for a price equal to that demanded for the imported goods that have paid customs duty. So it happens that while comparatively a few use the imported articles, millions of our people, who never use and never saw any of the foreign products, purchase and use things of the same kind made in this country, and pay therefore nearly or quite the same enhanced price which the duty adds to the imported articles. Those who buy imports pay the duty charged thereon into the public treasury, but the great majority of our citizens who buy domestic articles of the same class pay a sum at least approximately equal to this duty to the home manufacturer. This reference to the operation of our tariff laws is not made by way of instruction, but in order that we may be constantly reminded of the manner in which they impose a burden upon those who consume domestic products as well as those who consume imported articles, and thus create a tax upon all our people.

It is nearly a quarter of a century since any one who valued his reputation, or had any reputation at stake, has ventured to use in attacking protection this venerable and shop-worn argument. It will not bear a moment's investigation in the cold light of facts. Millions of dollars worth of imported merchandise are every year sold in our markets for less than they cost importers, and domestic goods of unknown value are every year sold for consumption without returning to the manufacturers the net cost of producing them. Only under exceptional conditions and for very brief periods, have domestic manufacturers been able to realize profits approximating the rates of duties imposed on competing imported articles. During long intervals it has been possible to export the surplus products of many lines of manufacture to markets in which the cheapest of foreign producers have equal and indeed better advantages. The President speaks of the "immense profits" of our manufactures, as if they existed in fact and not merely in imagination. We venture to say that manufacturing under the tariff has not returned exceptional profits, taking the average of any ten years since the close of the war. In some of the largest industries the margin of profits has been very narrow. We feel justified, therefore, in saying that an argument intended to influence the action of Congress, which proceeds from false premises to mistaken conclusions may, without impropriety, be characterized in the President's own words as "vicious, inequitable and illogical."

To this conclusion we are also brought by the clauses introduced into the message to mislead the manufacturers and wage-earners. The President says:

But the reduction of taxation demanded should be so measured as not to necessitate or justify either the loss of employment by the workingman or the lessening of his wages, and the profits still remaining to the manufacturer, after a necessary readjustment, should furnish no excuse for the sacrifice of the interests of his employees either in their opportunity to work or in the diminution of their compensation.

This and several paragraphs of like tenor are wholly inconsistent with the arguments with which he supports his attack upon protection. If the system which protects American labor is "vicious, inequitable and

illogical," should any concessions be made by honest reformers in the interest of those who are the admitted beneficiaries of this system? What the President says on this subject is evidently an afterthought. It has made his position even more ridiculous than his argument.

The object of this message is obviously to make the tariff the issue of the next Presidential election. Unless we wholly mistake the tone of public opinion in the United States, this is a grave and irreparable political mistake, viewing the matter from a Democratic standpoint. We have no concern on this score, but probably Mr. Cleveland has. If he sought to strengthen his own position and that of his party by his message, the weapon which was intended to create consternation in the ranks of the party in opposition will turn out to be a boomerang. We do not believe, however, that the party managers who assume the direction of the Presidential canvass next year will accept the tariff as an issue with which to go before the country. Mr. Cleveland could not have been elected on this issue, nor do we believe he can be re-elected on it. The strength of the two great parties in national politics is so evenly balanced that a very little will turn the scale either way, and we are quite sure that the party which risks its fortunes upon the platform which the President has furnished will find itself some 30 years behind public opinion on economic questions.

## The Condition of the Blast Furnaces on December 1.

As will be observed from the figures given below, there has been a decline in the capacity of the furnaces running on anthracite and coke pig. As yet, this falling off is small, but since then additional furnaces have gone out of blast. Still the make continues heavy, at the rate of 128,322 gross tons per week, not counting in the charcoal furnaces, which add 11,718 tons weekly, making the total 140,040 tons. The tendency, however, is now definitely in the direction of a slightly reduced make.

The following is the status of the anthracite furnaces:

## Anthracite Furnaces in Blast, December 1.

	Total number of stacks.	Number in blast.	Capacity per week.	Number of furnaces out of blast.	Capacity per week.
New York	29	13	8,708	16	4,661
New Jersey	15	5	1,434	10	3,185
Pennsylvania	8	8	221	0	221
Lehigh Valley	48	39	12,085	9	2,600
Spiegel	1	0	1	40	40
Schuylkill Valley	41	21	7,020	20	3,638
L. Susquehanna, Val.	19	9	5,975	5	1,050
Lebanon Valley	15	12	6,111	3	1,222
U. Susquehanna, Val.	18	5	2,591	9	1,625
Maryland	4	1	290	8	1,050
Total	198	122	89,487	76	18,054

	Furnaces in blast.	Capacity per week.
December 1	122	39,487
November 1	124	40,028
October 1	123	39,440
September 1	125	38,388
August 1	129	37,360
July 1	130	40,422
June 1	138	44,189
May 1	137	43,802
April 1	139	43,585
March 1	141	43,724
February 1	137	41,951
January 1, 1887	139	40,755
December 1	119	36,820
November 1	116	36,348
October 1	114	35,819
September 1	112	33,207
August 1	110	36,911
July 1	117	39,708
June 1	121	38,299
May 1	119	36,924

The production of anthracite pig-iron has fallen off somewhat during November, and since the beginning of the current month a slight further decline has taken place. In New York one of the Burden and one of the Hudson furnaces has gone in and one of the Elmira furnaces has resumed work. On the other hand, Cold Spring has blown out. We estimate the November product at 15,865 gross tons, exclusive, of course, of the Troy furnaces classed under coke. In New Jersey Chester, Franklin, Oxford, Pequest and Secaucus alone are producing, their total make during November having been 7,006 gross tons. In the Lehigh Valley the Crane Company entered the month with all furnaces running. The Lehigh Company had blown out one, and the Thomas Company were working with eleven, one of which has, however, since gone on the idle list. In the Schuylkill Valley the number of active furnaces was temporarily lessened by the idleness of the Plymouth furnaces, one of which, however, is expected to resume work at an early date. Leesport possibly may be producing before this report reaches our readers. In the Lower Susquehanna and the Lebanon Valley there have been no changes of any consequence. We estimate the November output of the latter, practically all made from Cornwall ore, at 26,224 gross tons. In the Upper Susquehanna Valley both the Danville furnaces are now idle, and Union has stopped for repairs. On the other hand, Marshall, which was idle from October 25 to November 26 on account of a gas explosion, is again running. We are informed that the majority of the shares of the Bloomsburg Iron Company owning the two Ironton furnaces have recently changed hands, Knorr & Winterstone, attorneys of Bloomsburg, being the purchasers. Who the owners will ultimately be is not yet known.

This and several paragraphs of like tenor are wholly inconsistent with the arguments with which he supports his attack upon protection. If the system which protects American labor is "vicious, inequitable and

## Bituminous and Coke Furnaces in Blast December 1.

	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York	3	2	2,660	1	1,300
Pennsylvania	19	19	19,000	0	0
Spiegel	1	1	450	0	0
Shenango Valley	19	15	8,900	4	2,176
Juniata & Conemaugh	1	6	6,332	8	1,492
Spiegel	1	1	191	0	0
Youghiogheny Valley	1	1	4,483	2	700
Miscellaneous	1	1	450	0	0
Maryland	1	1	2,044	8	580
Virginia	7	3	3,372	4	885
West Virginia	6	5	2,450	1	200
Kentucky	2	2	780	2	560
Ohio	14	9	6,713	5	3,350
Hocking Valley	15	2	395	13	1,987
Hanging Rock	14	11	2,044	3	580

then in 1885-86. While cotton and jute have furnished the usual large amounts for shipment, linseed and rapeseed fell off, because of poor crops. The exports of cotton twist spun in India to China are beginning to attain figures seriously alarming English spinners, but the reverse is the case with Indian cotton cloth, which the Chinese do not appear to take very readily. Of the total export of India the mother country received 39 per cent., as compared with 43 per cent. five years since, there being a marked tendency to ship direct from India to Continental Europe, and thus become less dependent on London.

American trade has, on the whole, not varied much:

*Import from India. Domestic export.*

Fiscal year.

1887. .... \$18,826,090

\$3,902,047

1886. .... 17,347,825

4,330,141

The census of February 17, 1881, fixed the population of India at 253,891,821; it may safely be assumed to be 275,000,000 this year, the greater part of the people being hardworking small farmers capable of absorbing almost unlimited amounts of goods like petroleum, provided they combine good quality with cheapness. Hence the growing struggle between the American and Russian article is explained.

#### Our New Navy.

The report of the Secretary of the Navy is among the most interesting documents accompanying the message, and is especially satisfactory in showing that good progress has been made by our manufacturers in providing the country with the plant necessary for the construction and armament of modern vessels of war. These establishments are now preparing to produce steel forgings for the heavier guns, armor for ironclad vessels, and the rapid-fire guns essential to a complete armament. The ease with which apparently grave difficulties were overcome is highly creditable to the skill and enterprise of American artisans. In the opinion of the Secretary our private shipyards can now produce war ships equal to those produced elsewhere, and perhaps superior to them, when these industries shall have become established. A high standard has been reached in the manufacture of material, possibly the highest ever obtained. The quality of the steel made on the Pacific Coast is especially commended. All of the unarmored vessels heretofore authorized by Congress are in course of construction. Their names are as follows:

Name.	Type.	Displacement, tons.
Charleston	Protected cruiser	8,730
Baltimore	Protected cruiser	4,793
Gunboat No. 1	Cruiser	1,700
Gunboat No. 2	Cruiser	890
New Gunboat	Protected cruiser	4,083
Cruiser No. 4	Protected cruiser	4,324
Cruiser No. 5	Protected cruiser	4,083
Gunboat No. 3	Cruiser	1,700
Gunboat No. 4	Cruiser	1,700
Dynamite cruiser		725

The contract has also been awarded for a first class torpedo-boat of 99 tons displacement. One of the two ironclad vessels authorized by Congress, each to cost not exceeding \$1,500,000, exclusive of armament, will be built upon the plans of the Department, and one upon those of the successful competitor. What disposition shall be made of the \$2,000,000 appropriated for coast and harbor defenses has not yet been determined. As the result of naval maneuvers designed to demonstrate the value of torpedo warfare, Secretary Whitney seems to have formed an unfavorable impression. The fact that torpedo-boats are of value only upon rare and accidental occasions, as, for example, in the night, or when the smoke of battle conceals them, seems to rule them out as a reliable weapon for coast and harbor defense. How to carry high explosive projectiles is therefore a question that is yet to be determined. A trial of the pneumatic dynamite guns upon the boat building for them will, in a few months, remove any questions respecting their efficiency. The development of this gun, we are told, promises to be the most notable event of the year.

On the question of an auxiliary navy the Secretary says: "The Department has informed itself fully of the different systems of organization for coast defense and naval reserves at present in force in foreign countries, and is prepared to formulate a general plan for a similar organization to meet the requirements and conditions of our own institutions. It should resemble in organization that of the militia or national guard, rest upon the foundation of local interests, contemplate the employment and rapid mobilization of steamers enrolled on an auxiliary navy list, and be calculated to produce the best results upon a comparatively small national expenditure. I ask for this question the earnest consideration of Congress." To be ready for any emergency, important additions to the shop machinery at the various navy-yards are recommended, more especially modern tools. The estimates for the fiscal year ending June 30, 1889, amount to about \$23,500,000. In a review of Secretary Whitney's paper the one conspicuous fact is that under the recent more liberal appropriations by Congress a new departure can be chronicled in naval construction, indicating that from henceforth there is promised a substantial development in the United States of materials and skilled industry applicable to this art which in the end may prove adequate to any emergency.

Mr. William Mulligan, for many years the maker of the famous "Ulster" iron, died suddenly on Tuesday morning.

#### The Coal Strike and the Pig Iron Situation.

(From an Occasional Correspondent.)

To the Editor of The Iron Age—DEAR SIR: I intimated in a letter a few weeks since to your valuable journal that, owing to the long continued strike at the coal mines of the Lehigh region, the make of pig iron would probably fall off to the extent of 100,000 tons in the iron-making districts heretofore using this coal almost exclusively. The strike having continued much longer than at first calculated on, this estimate is likely to prove too small. The men accustomed to run on the Lehigh coal were not so well used to the coal from the Wyoming and Lackawanna regions, and, in consequence, a number of furnaces have chilled and will be out of blast for some time to come. In others the make has been very greatly decreased; at present, as you will notice, only four of the 20 furnaces in New Jersey are in blast, while recently several in the Lehigh Valley have blown out, and several others are running very moderately, with their grades of iron improved. These furnaces now out will all probably be blown in again before the twenty odd new furnaces in course of construction in the Southern States are ready, so that, after all, the stoppage of these Northern furnaces (temporarily) will not be of the advantage first calculated upon to them. The stock of iron ores, notwithstanding the decreased consumption, has not increased at the furnaces or mines, and real good ores are really somewhat scarce and in better demand than anything else connected with iron making. Not many new openings of iron deposits have been made during the past two years, while many of the older ones have been worked to a very small profit for their owners. There is, however, just at present more attention being given to a survey of the ore bearing fields by interested parties than for years past, and in the near future I hope to inform you of some excellent finds in New Jersey and East Pennsylvania. Very truly yours,

C. S.  
December 12, 1887.

#### The Coming Meeting of the Iron and Steel Institute.

The decision of the Council of the Iron and Steel Institute to hold an autumnal meeting of the Institute for 1888 in this country appears to have met with cordial approval among English and Continental ironmasters and engineers. The following is a list of members, just issued by Mr. J. S. Jeans, secretary, who have thus far accepted the invitation:

Adamson, Daniel, The Towers, Didsbury, near Manchester, (President).  
Addie, John, Langloan Iron Works, Coatbridge, N. B.  
Aldyman, Thomas, West Gorton, Manchester.  
Akrill, Charles, Golds' Green Foundry, West Bromwich.  
Anderson, Alfred H., 1 Surrey street, Sheffield.  
Anderson, C., 13 St. Helen's Villas, Stamford Road, Forest Hill, London.  
Anderson, Samuel, Westbury Iron Works, Wiltshire.  
Angus, Robert, Lugar Iron Works, Cumnock, Ayrshire.  
Arron, Thomas A., Genniston Iron Works, Glasgow.  
Ashbury, Thomas, 215 Plymouth Grove, Manchester.  
Baare, Fritz, Bochum, Westphalia.  
Bain, Sir James, 3 Park Terrace, Glasgow.  
Bain, J. R., Harrington Iron Works, Harrington, Cumberland.  
Bamlett, A. C., Thirsk, Yorkshire.  
Bantock, Thomas, Merridale House, Wolverhampton.  
Bargate, George, Barrow-in-Furness.  
Barlow-Massicks, Thomas, The Oaks, Millom, Cumberland.  
Barningham, Thomas, Corporation Street, Manchester.  
Barrow, James, Maesteg, Glamorganshire.  
Bayley, Jno. Clowes, 1 Queen Victoria street, London, E. C.  
Beard, George, Gartcaoch, Glasgow.  
Beckwith, Jno. H., Knott Mill Iron Works, Manchester.  
Bell, Charles, 21 Victoria Place, Stirling.  
Bell, Chas. Wm., Yewhurst, East Grinstead, Sussex.  
Bell, Sir Lowthian, Bart., F.R.S., Rounton Grange, Northallerton (Past President).  
Bell, T. Hugt, Clarence Iron Works, Middlesbrough.  
Bell, Charles Ernest, Park House, Durham.  
Blair, Geo. MacLennan, Clutha Iron Works, Glasgow.  
Bleckly, C. A., 61 King William street, London, E. C.  
Bleckly, W. H., Warrington.  
Bradley, B. G., Parkfield House, Wolverhampton.  
Brock, A., 110 Cannon street, London, E. C.  
Brooke, Edward, Edgerton, Huddersfield.  
Brown, Joseph C., Hazel Holm, Cleator, via Carnforth.  
Bull, James, The Brampton, Newcastle-under-Lyme.  
Burnett, William, Millgrove, Whitehaven.  
Bush-Dudley, J. C., Fort House, South Molton, North Devon.  
Butler, Edmund, Kirkstall Forge, Leeds.  
Butler, Isaac, Panteg House, near Newport, Monmouthshire.  
Byrne, Samuel Henry, The Farre Close, Brighouse, Yorkshire.  
Carbut, E. Hamer, 19 Hyde Park Gardens, London (president of the Institution of Mechanical Engineers).  
Cawley, George, 70 Market street, Manchester.  
Chapman, John G., Tower Hill, Middleton One-Row, Darlington.  
Cleminson, Jas., 7 Westminster Chambers, London, S. W.  
Cochrane, Charles, Green Royde, Fedmore, near Stourbridge.  
Coghlan, J. H., Grosvenor House, Headingley, Leeds.  
Copestate, Sampson, Burgess Hill, Sussex.  
Craven, Jno., Craven Bros., Manchester.  
Crippin, Edwd. Frederick, Brynn Hall Collieries, near Wigan.  
Crossell, S., Spring Bank, North Side, Workington.  
Crowther, Clement, Stour Vale Iron Works, Kidderminster.

Crum, John, Lowther Hematite Iron Works, Workington.  
Cunningham, John, 127 St. Vincent street, Glasgow.  
Cunningham, J. C., Craigends, Johnstone, N. B.  
Daelen, R. M., Dusseldorf.  
Dalton, George, The Yews, Headingley, Leeds.  
Dalzell, Wm., Whitehaven.  
Daniel E. Rice, Cwmgelly, Swansea.  
Darby, J. H., Brymbo Iron Works, near Wrexham.  
Davie, Thomas, Waverley Iron and Steel Works, Coathbridge, N. B.  
Davis, J. Henry, 147 Cannon street, London.  
Davy, David, Broom Croft, Parkhead, Sheffield.  
Dennis, W. F., 101 Leadenhall street, London, E. C.  
Dickinson, Samuel, Newbridge, Wolverhampton.  
Dixon, Henry E., Audley, Surbiton Hill Park, Surbiton.  
Dove, George Jr., Redbourn Hill Iron Works, Frodingham, near Doncaster.  
Eadon, Robt. Renton, President Works, Sheffield.  
Easton, Edward, Delahay Street, Westminster, S. W.  
Edge, John H., Coalport Works, Shifnal, Salop.  
Ellacott, Robert H., Engineering Works, Plymouth.  
Ellis, T. L., North British Iron Works, Coatbridge, N. B.  
Evans, Christmas, Heolgerrig, Merthyr Tydfil.  
Farnworth, William, Swinden Iron Works, Dudley.  
Feldtmann, Rudolph, 116 St. Vincent street, Glasgow.  
Fisher, M. F., 56b, Kaiserstrasse, Magdeburg, Germany.  
Fossick, William G., 86 Cannon street, London, E. C.  
Fry, Theodore, M. P., Darlington.  
Garrett, Geo., Waverley Iron and Steel Works, Coathbridge, N. B.  
Gee, Geo., Iron Villa, Gold Tops, Newport, Monmouthshire.  
Gilchrist, P. C., Ruscombe, Willoughby Road, Hampshire, N. W.  
Gilmour, Allan, Maryport Hematite Iron and Steel Co., Maryport.  
Glover, Ben Bradshaw, Beech Bank, Newton-le-Willows, Lancashire.  
Gordon, Joseph G., Queen Anne's Mansions, S. W.  
Goransson, A. H., Steel Works, Sandviken, Sweden.  
Gossell, O., Jr., 110 Cannon street, London, E. C.  
Green, Edward Llewellyn, Fairy Land, Neath, South Wales.  
Greenwood, William Henry, Firth College, Sheffield.  
Gutham, Max, I Kantgasse 6, Vienna, Austria.  
Hadfield, Robert A., Ashdell, Sheffield.  
Hall, J. F., Brightside Works, Sheffield.  
Hammond, Robert, Cannon street, London, E. C.  
Harrison, G. K., Hagley, near Stourbridge.  
Hatton, Geo., Hagley, Stourbridge.  
Hay, A. M., 111 Union street, Glasgow.  
Head, Jeremiah, Middlesbrough. (Past President of the Institution of Mechanical Engineers.)  
Heath, James, Biddulph Iron Works, Stoke-on-Trent.  
Hellion, Robt., 47 New Lowther street, Whitehaven.  
Heywood, H., Cardiff.  
Hickman, Alfred, Spring Vale Furnaces, Wolverhampton.  
Hodges, P., 238 Barnsley Road, Sheffield.  
Holt, Henry Percy, The Cedars, Didsbury, Manchester.  
Homer, Charles J., Stoke-upon-Trent.  
Hosking, Richard, Clarence House, Dalton-in-Furness.  
Houghton, John, The Beeches, Moore, near Warrington.  
Howard, James, Clapham Park, Bedfordshire.  
Howie, Henry, Harrington, Cumberland.  
Hughes, Wm., 19 Lionel street, Birmingham.  
Hulse, J. W., Brookside, Didsbury, Manchester.  
Jackson, W. F., Bowring Iron Works, Bradford, Yorkshire.  
Jenkins, Sir J. J., The Grange, Swansea.  
Jenks, Isaac James, Cleveland Iron Works, Wolverhampton.  
Jenks, Walter, Minerva Works, Horseye Fields, Wolverhampton.  
John, William, Barrow Shipbuilding Works, Barrow.  
Johnson, W. H., 26 Lever street, Manchester.  
Johnston, James, Fairfield road, Buxton.  
Kellert, William, 24 King street, Wigan.  
Kenrick, Geo. H., Whelstone, Somerset road, Edgbaston, Birmingham.  
Kirk, Henry, Workington.  
Laing, James, Sunderland.  
Lancaster, Joshua, Rhewl House, Mostyn, Flintshire.  
Larsen, Jno. Daniel, 24 Belvedere Road, Upper Norwood, S. E.  
Leigh, J., Brimington Hall, Stockport.  
Lewis, H. W., Treherbert, near Pontypridd.  
Lewis, Sir William Thomas, Mardy, Aberdare.  
Lindheim, W. Von, Lugeck 3, Vienna.  
Lithman, Jos. E., 14 Fenchurch street, E.C.  
Ljungberg, E. J., Falun, Sweden.  
Lloyd, Samuel, Sparkbrook, Birmingham.  
Long, A. de Lande, Stockton-on-Tees.  
Lowood, John Grayson, Ganister Works, Sheffield.  
Lucas, H., Duseeldorf, Germany.  
Macarthy, G. E., Ashfield House, Newcastle-on-Tyne.  
Macco, H., Siegen, Germany.  
MacLennan, Joseph, Bilbao, Spain.  
Manby, Cordy, Dudley.  
Margery, Jules, Achener Hütte, Rothe Erde, near Puy-la-Chapelle.  
Marden, Benjamin, London road, Manchester.  
Martell, B., Lloyd's, White Lion court, Cornhill, London.  
Martin, Edward P., Dowlais, Glamorganshire.  
Massey, W. H., Twyford, Berks.

Mayberry, Joseph, Oldcastle Tin Plate Works, Llanelli.  
McCowan, Wm., Roseneath, Whitehaven.  
McDonald, Wm., Fenchurch street Station, London, E.C.  
McLaren, C. B., 3 New Court, Lincoln's Inn.  
McLellan, George S., Clutha Steel Works, Glasgow.  
McClelland, Andrew S., 115 St. Vincent street, Glasgow.  
Molineaux, W., Bulls Bridge Iron Works, Moxley.  
Monks, F., Brooklands, Warrington.  
Morris, Claude John, The Mount, Altringham.  
Mosley, Lt. Col. Paget, 81 Warwick road, Earl's Court, London, S. W.  
Nash, H. B., 8 Ullet road, Liverpool.  
Neilson, Walter, Jr., Conservative Club, Glasgow.  
Nobury, William Edward, Knott Mill Iron Works, Manchester.  
Ogilvie, A. G., 4 Great George street, London.  
Ogle, Percy G., Yniscedwyn Iron Works, Swansea.  
Otto, Dr. K. Dahlhausen, Ruhr, Germany.  
Page, John, Wednesfield Park, Wolverhampton.  
Parker, William, Lloyd's, White Lion Court, Cornhill, London.  
Parkes, Henry P., Tipton Chain, Cable and Anchor Works, Tipton.  
Parkes, Ebenezer, Atlas Works, West Bromwich.  
Pattison, John, Naples, Italy.  
Peake, John Nash, the Tilerie, Tunstall, Staffordshire.  
Pearson, Jos. H., Handsworth, near Birmingham.  
Pearson, Thos. H., Dallam Forge Company, Wigam.  
Pease, Henry Fell, M. P., Darlington.  
Pease, Jos. A., 92 Northgate, Darlington.  
Peile, Wm., Stainburn, Workington.  
Pepper, Joseph E., Clarence Iron Works, Leeds.  
Piedboeuf, Gustave, Aix-la-Chapelle.  
Platt, James, Atlas Iron Works, Gloucester.  
Foengen, Rudolph, Dusseldorf, Germany.  
Pope, Samuel, Tinsley House, Tinsley, Sheffield.  
Pourcel, Alexandre, Saltburn-by-the-Sea.  
Putnam, William, Darlington Forge, Darlington.  
Benton, Benjamin Mann, Savile street, Sheffield.  
Richards, E. Windsor, Middlesbrough.  
Richards, Job, Havelock House, Shirley road, Accrington, Birmingham.  
Richardson, Joseph, Stockton-on-Tees.  
Riley, J. C., 3 Summerhill Grove, Newcastle-on-Tyne.  
Riley, Edward, 2 City Road, Finsbury Square, London, E. C.  
Riley, James, Glasgow.  
Robinson, T. N., Mount Faling, Rochdale.  
Roocur, G., 18 Avenue Rogier, Liege, Belgium.  
Rollason, James, Bromford Wire Mills, Erdington, Birmingham.  
Rummens, Francis, 235 Elgin Avenue, Maida Vale, W.  
Shanks, Thomas, Jr., Johnstone, N. B.  
Schulz, G., Bochum, Westphalia.  
Schulz, George, Botolph House, Eastcheap, London, E. C.  
Senior, George, Pond's Forge, Sheffield.  
Share, George W., 72 King William street, London, E. C.  
Simon, Henry, 20 Mount street, Manchester.  
Simpson, J. S., Harrington Iron Works, Harrington, Cumberland.  
Smith, A. Pye, 2 Victoria Mansions, Westminster, London.  
Smith, Fred, Caledonia Works, Halifax, Yorkshire.  
Smith, G. Jackson, Clyde Street Works, Sheffield.  
Smith, Joseph H., Summerhill, Kingswinford, near Dudley.  
Smith, Robert, Castle Hill, Sheffield.  
Smith, W. Ford, Gresley Iron Works, Manchester.  
Snelius, G. J., F. R. S., West Cumberland Iron and Steel Works, Workington.  
Stead, J. E., 5 Zetland road, Middlesbrough.  
Steer, Edward, Castle Works, Tydes, near Newport.  
Sterne, Louis, 2 Victoria Mansions, Westminster, S. W.  
Steven, Thos., Milton Iron Works, Glasgow.  
Stevenson, John, Acklam Iron Works, Middlesbrough.  
Stoddart, Charles John, Park Gate Iron Works, Rotherham.  
Storey, Sir Thomas, M. P., Lancaster.  
Storr, Walter W., Landore R. S. O., South Wales.  
Strang, J. H., Lochburn Iron Works, Glasgow.  
Strick, Jno., Silverdale, North Staffordshire.  
Sturrock, David, Carntyne Iron Co., Glasgow.  
Summers, James W., Globe Iron Works, Stalybridge.  
Sunner, William, Brazenose street, Manchester.  
Thiele, Alex., Phoenix Iron Works, Ruhrt, Rhineish Prussia.  
Thomas, R. B., Lydbrook, Gloucestershire.  
Thomas, William, Bryn Awel, Aberdare.  
Thomlinson, Wm., Seaton Carew, West Hartlepool.  
Thompson, S. Jno., Manor Iron Works, Wolverhampton.  
Tinn, Joseph, Bristol Bank Buildings, Bristol.  
Trubshaw, Ernest, Western Tin Plate Works, Llanelli, South Wales.  
Tucker, A. E., Holly street, Smethwick.  
Turner, Thomas, Congreaves Iron Works, near Birmingham.  
Valentine, Charles J., Marshside, Walsall.  
Vivian, John, Whitehaven.  
Wadham, Edward, Milwood, Dalton-in-Furness.  
Walker, William, Saltburn by-the-Sea, Yorkshire.  
Walrand, Charles, Longwy, Meurthe et Moselle, France.  
Wells, Charles, Moxley Steel and Iron Works, near Wednesbury.  
Whitehead, John, Penwortham Priory, Preston, Lancashire.

Whitwell, William, Thornaby Iron Works, Stockton-on-Tees.  
Wilkinson, George, Tividale Sheet Mills, Tipton.  
Willans, J. W., Manchester.  
Williams, John, Eraeside, Newdort, Mon.  
Williams, R. Price, 38 Parliament street, London.  
Williams, Winfred, Newhall Works, Birmingham.  
William, William, Forest Upper, Stutton, Swansea.  
Williamson, Richard, Workington, Cumberland.  
Wilson, Matthew G., 3 Oxford street, Glasgow.  
Wood, B. G., Wardsend Steel Works, Sheffield.  
Woodall, John W., Scarborough.  
Wright, A. Leslie, 2 Hawthorn terrace, Newcastle-on-Tyne.  
Ybarra, Señor Don Jose A. de, Ronda de Recoletos 3, Madrid, Spain.  
Young, James, Lowmoor Iron Works, near Bradford.  
Zeitz, Th., St. Peter's Close, Sheffield.

#### The Tariff Outlook in Washington.

(From Our Regular Correspondent.)

WASHINGTON, D. C., Dec. 13, 1887.

At the first blush the President's message was received with a variety of comment defined in degrees of favor or disfavor by party lines. It was, however, with a surprise even to the ultra leaders of the majority of the House. In aggressiveness, they quietly hinted it was a little beyond the safe limits of equivocation on economic doctrines affecting the tariff. The President, in order to make the issue more clear and distinct, disengaged his message of all matters of recommendation to Congress. Such men as Speaker Carlisle are more puzzled by its enunciations than those who were less in the Executive confidence before the document came out. The Speaker had been in frequent conference on the subject, and Mr. Randall, on the Sunday night before the assembling of Congress, was called into consultation. Both gentlemen therefore looked for a document which would afford them a common ground of discussion in a direct line to harmony. The Speaker, in his inaugural, took a very conservative and hopeful view of the situation and aimed at putting his radical friends in a frame of mind which would give a friendly reception to the expected conservative views of the President. The message was therefore a surprise, as it brought the points at issue no nearer a solution than they were before. After a week's discussion of the message, pro and con, the more it is examined the further apart the two wings of the majority find themselves. They have not abandoned hope, however, of reaching a compromise measure, but the terms of agreement are as vague as they were before the President laid down the Administration doctrine.

There is one effect which the message has had, and that is to force Mr. Blaine into the contest. The statesman from Maine came promptly to the front from his engagements at the French capital and announced his platform. The politicians have now pretty generally settled in their minds that the contest of 1888 will be fought under the leadership of the standard bearers of 1884, and upon an issue laid down by themselves six months in advance of the conventions or

THE  
Iron Age Directory

## AND

#### **Index to Advertisements.**

## Iron Making in the Birmingham District.—II.

## THE FUEL.

Until now the bulk of the coke used in the Birmingham district has been made from coal from the Warrior field, the Pratt mines and coke works, owned by the Tennessee Coal, Iron and Railroad Company, furnishing by far the largest supply. Out of the 1075 ovens in Alabama at the close of 1885 914 ovens were in the Warrior coal field. It is estimated that at the close of 1886 there were in the neighborhood of 1300 ovens in Alabama, of which nearly 1100 ovens were in the field mentioned. Fully 1000 ovens were then building, and more are under construction now. In spite of this activity the furnaces of the Birmingham district have frequently suffered during the past year, like those in other sections of the South, from a scarcity of coke. The pressure on the producers of the latter has been enormous, and it is probably not a matter for surprise that under the circumstances the quality has not been up to the standard which the character of the coal might warrant. Usually the ash varies from 9 to 12.5 per cent., while the sulphur fluctuates between 0.75 and close to 2 per cent. The appearance of some of the coke in the stock piles of some of the furnaces visited was not, however, calculated to impress an ironmaster favorably with the fuel. We repeat that this is undoubtedly an exceptional condition of affairs, not altogether unknown in the most famous district of Pennsylvania in times when a heavy demand and high prices are apt to make the producer less careful and the consumer far less critical. Yet it is an important matter, since it seriously injures furnace-work, and has been the source of much of the irregularity in running which has characterized all but a few of the works during the year. It is a matter easily mended when supply and demand become more evenly balanced. If the average of coke consumption, including wastage, &c., for the furnaces were known, it would probably show higher figures than even some of the furnace men are now willing to admit. But it would be dangerous proceeding to base upon such figures any conclusions bearing on the real capacity of the works to meet the markets under ordinary conditions. Some of the coke examined had freckled appearance from small particles of slate which probably could be easily got rid of by careful mining and by washing. The question of a fuel supply is bound to remain a disagreeable one for Birmingham iron producers for some time to come, and will have some effect upon the quantity of pig iron coming from that quarter to the markets of the country during 1888.

Mr. John S. Kennedy, of Tuscaloosa, has published in the Birmingham *Age* the following estimate of the output of coal in the district:

	Tons daily
Pratt mines	2,500
Craigburg, G. P. R. R.	800
Henry Ellen, G. P. R. R.	300
Woodward, estimated	500
New Castle	2.0
Alabama Connellsville, estimated	2,000
Blocton, estimated	1,000
Four small mines on L and N. R. R.	400
Total	7,750

It is probable that these figures are excessive. Thus the figure for the Alabama Connellsville Company is really only 200 tons, so that the total ought to be 5950 tons. Yet the output mentioned would not be adequate to supply the coke ovens for the blast furnaces built and building alone, not to speak of locomotive, steam raising, rolling mill and domestic use of the large territory tributary to the Warrior, Coosa and Cahaba fields. With the iron plants now in operation and those building at Birmingham, Trussville, Sheffield, Florence, Anniston and Gadsden running at full capacity the coke consumption annually would not be less than 1,400,000 gross tons per annum, which would call for about 3500 ovens and over 2,250,000 tons of coal. In spite of the efforts made by the older producers to largely increase their output, the progress made in that direction, while highly creditable, has not been great enough to avoid occasional coke scarcity, although during the year the consumption has not increased at anything like the rate which will follow the beginning of operations by the furnaces now building. The Birmingham furnace now completed has been forced to go to Pocahontas, Va., for fuel. Of the new furnace plants building the majority near Birmingham are putting in their own ovens. At Bessemer 275 are going up, at the Thomas Furnace 150, at North Birmingham 250, at Trussville 200, while the Eureka Company are putting up 50 new ovens at Helena, the Woodward Company are adding 150 ovens to their plant of 143, and the Woodstock Company are building 300 ovens at Blocton. The Ensley mines adjacent to them for coke, when there will be 800 ovens in operation by the 1st of January. The furnaces in the vicinity of Birmingham and some of those at a distance are therefore preparing for the future. But it may be questioned whether, with all the activity in opening up new coal territory, the mines will be sufficiently developed to get ahead of the demand with their capacity for some time to come. In the Warrior field at least one of the companies has had a vexatious experience with a fault, causing a delay and a costly search for the faulted vein. It is within the range of possibilities that a similar trouble may check the speed with which others open up new territory, in fact the latest advices state that a leading company has lately struck a fault.

So far as the fuel consumption of the furnaces in the Birmingham district is concerned, the figures vary widely. As low as 1.25 tons of coke is claimed, but the general range probably lies nearer 1.50 to 1.75, with the average closer to the latter figure than the former.

## LIMESTONE.

The principal sources of supply of limestone for the furnaces of the Birmingham district are the quarries recently opened by the Birmingham Mining and Mfg. Company in the vicinity of the town, and at Blount Springs. The stone at the former point carries from 95.25 to 99.25 per cent. of car-

bonate of lime, with about 1.5 per cent. of silica as the average. The haul to the furnaces averages about 8 miles, and the selling price is between 65 and 75 cents a ton. The quantity used by the furnace companies fluctuates according to the amount of hard ore carried in the burden. One furnace which runs on half hard and half soft ore uses only  $\frac{1}{3}$  ton of limestone to the ton of iron.

## LABOR.

It will be readily appreciated from the data given in regard to the grade of the ores used, the quantity of coke required, that the labor item, so far as the handling in the stockhouse is concerned, is heavier, so far as day's labor is concerned, than at the majority of furnaces in other parts of the country. It is true that common labor is cheap, but, on the other hand, it is certainly not as effective, and what is an important consideration, is far less reliable. Until now common labor in the South has been strikingly migratory, which imposed additional burdens and trials upon furnace-men in a new district. Practically they have been forced to educate two or three times as many men as were really needed for a full crew, and the establishment of new works is likely to keep this feature prominent for at least some time to come. So far as skilled labor, engineers, machinists, mechanics, is concerned, the furnace companies must pay prices above the average, because the country itself does not furnish this class of men, who must be brought from the North with some special inducements. The unreliability of common labor is often a serious factor. Pay-day is only too often followed by practically a suspension of work for two or three days, and a passing circus has charms for the average colored miner or furnace hand which no threats or promises can overcome. The result naturally is that in spite of a low per diem rate for the common labor the cost per ton of iron is not less than \$1.75, and ranges up to \$2. Another very serious matter is the grading of Southern iron, the practically impossible test being imposed upon Southern managers of cutting up their product into

## TWELVE GRADES OF IRON.

The following formidable array of figures represents the make of one furnace in 10 days and in one month. It is just to add that this does not represent average work, because the furnace was stopped three days. It is simply given to show what an incubus upon the industry such a system of grading must naturally be:

Grade.	Tons.	Tons.
No. 1 foundry	300	31 $\frac{1}{2}$
No. 2 foundry	200	200
No. 2 $\frac{1}{2}$ foundry	165 $\frac{1}{2}$	162
No. 3 nail	230 $\frac{1}{2}$	63 $\frac{1}{2}$
No. 2 bright	15 $\frac{1}{2}$	13 $\frac{1}{2}$
No. 1 bright	50 $\frac{1}{2}$	27 $\frac{1}{2}$
No. 2 bright	38 $\frac{1}{2}$	15 $\frac{1}{2}$
No. 1 open silver gray	30 $\frac{1}{2}$	33 $\frac{1}{2}$
No. 2 close silver gray	18 $\frac{1}{2}$	19 $\frac{1}{2}$
Mottled	3	25
White		

But not only is the furnace manager weighted down with the necessity of such a ponderous system of grading, but it is urged by those who have had experience elsewhere that the grading of Southern iron has started on an altogether false basis. It is claimed, although that claim is vigorously disputed by producers in rival sections, that in reality Southern No. 2 foundry is the equal of No. 1 in older districts; that the system of grading adopted was done in deference to the desires of middlemen, who held that they could more easily introduce the iron, in this way disguising concessions. However justifiable that course may have been, it is argued that Southern iron has now conquered its place in the markets and that a reform is urgently needed and can now be carried through. The characteristics of the Southern grades are explained by a Southern producer as follows:

No. 1 Foundry. This is a large, open-grained iron which is not often made, because the furnace is working too hot when it is produced.

No. 2 Foundry. This is insisted is really the equivalent of No. 1 foundry of the North.

No. 2 $\frac{1}{2}$  Foundry. The equivalent of No. 2 foundry of the North.

No. 1 Bright. This is a light colored foundry iron, equal in grain to No. 1, except that it is lighter in color. It is made in the North, but is not separately graded there.

No. 2 Bright. Equivalent to No. 2 foundry of the North, except that it is lighter in color.

No. 1 Mill Iron. This is a good mill iron, which by some might be classed as a foundry pig. It is claimed to be the equivalent of the excellent Northern gray forge.

No. 2 Mill. This is the ordinary mill iron.

Gray Forge. This is a special grade, sometimes called for. It is a mixture of one-half No. 1 mill and one-half No. 2 mill iron.

1 C An open silver gray iron.

2 C A close silver gray iron.

Mottled and White. These have the usual characteristics.

This is the producer's side of the argument, and we are informed that efforts are now being made to bring about a reform in the direction of grading what is now No. 2 foundry as No. 1 foundry, and selling it as such. It would be of interest to the trade to learn the views of other sellers and of consumers on a question which is likely to be seriously agitated in the near future.

A telegram from Ishpeming, Mich., dated the 11th inst., says: "The contract for the building of ore docks at Marquette and St. Ignace has been let to Thomas H. Hamilton, of Toledo. Three docks at Marquette, having a capacity of 18,000 tons, will be increased to 33,000 tons. An additional dock at St. Ignace will hold 10,000 tons. It is the largest single contract of the kind ever let. The new docks will be built by the opening of navigation next spring."

At a meeting of the stockholders of the A. C. Barnes' Whip Company, of Westfield, Mass., held on Wednesday, the 7th instant, a dividend of 8 per cent. was declared, and the following officers were re-elected: President, A. C. Barnes; vice-president, George Pierne; clerk and treasurer, H. M. Gowdy. The company expect to move into the large factory now building for them by February 1.

## Enterprise Reversible Float and Outlet Valve.

The Sandwich Enterprise Company, Sandwich, Ill., have recently put this valve on the market. It is represented in the accompanying illustrations, Fig. 1 showing its use as a float-valve and Fig. 2 as a tank outlet-valve. When used as a float-valve it will be observed that the valve opens outward with the direction of the flow, but is held closed at the proper time by the float acting on the long arm of the lever and causing the short arm to assume a nearly vertical position and

cherry or in natural wood and cabinet finished, with lifts and face plates. The manufacturers place this screen on the market with confidence that it will meet the wants of the trade, and allude to it as a new departure in adjustable screens, and free from any objections found in others.

## The Leonard Milk Cooler.

The accompanying illustration represents a new device, manufactured by the Grand Rapids Refrigerator Company, of Grand

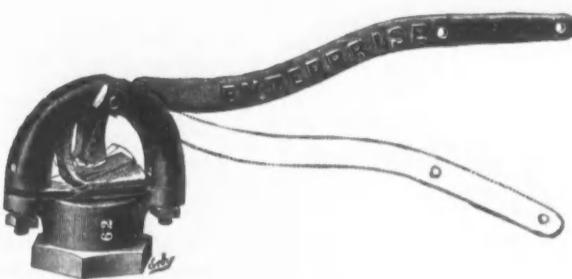


Fig. 1.—Reversible Float and Outlet Valve.

closing the valve. When closed the pressure, however great, instead of being borne by the float is resisted by the pivot bolt in the arch. The body of the valve is of brass threaded for pipe, and adapted to be screwed on with an ordinary wrench. The point is made that it will not rust fast to the pipe, as is often the case with iron valves, and that the valve seat being of brass and lathe faced makes a perfect joint and continues smooth with wear. The valve is described as made of the best quality of leather, and is held in place by the bolt securing one end of the arch to the body. The valve weight is made with reference to taking up loss by wear, and also has a horn which the weight of lever acts upon in opening, and allows free passage of water when under pressure. The lever is made of good length to insure easy and reliable working of the valve by small floats. It is explained that in case of pipes being placed in corners or at sides of tanks where there would not be sufficient room to revolve the lever, and after the valve has been screwed on the pipe, it can be replaced. Fig. 2 represents the valve used as a tank outlet-valve. When it is desired to use it in this way the lever is removed and replaced reversed, when the raising of the lever, as with a cord passing over a pulley on the edge of the tank, will close the valve, while releasing it will cause the weight of the lever to close and securely hold it shut. The

Rapids, Mich., which is intended to be used in connection with their upright refrigerators. It consists of a milk can, with a tight-fitting lid, all made of the best XXX bright tin, surrounded with a water-tank made of galvanized iron. A glass window, 2 inches in diameter, is set in the front end of the tank, through which the milk can be seen. A nickel-plated faucet is attached to the under side of the can. The skim milk can

durability and smooth working. The liquid used is non-freezing mixture, and the casing being practically air tight, there is little or no evaporation, and dust is excluded. As will be inferred from the illustration, opening the door compresses the spring, and in this way the requisite power is obtained for closing the door. In closing the door shuts quickly until it is three-fourths closed, at which point it cushions against the liquid and travels more slowly the rest of the distance, and stops in its proper position, thus preventing slamming, &c. The closing speed of the door is controlled by a regulating screw which is operated from the surface, this screw regulating the size of the aperture through which the fluid is forced. The point is made by the manufacturers that as there is only one spring used, as against four in a pair of ordinary double-acting spring hinges, and this spring is compressed and not twisted, the liability of breaking is reduced to a minimum, or indeed entirely overcome. The point is also made that the mechanism is so contrived that the greatest pressure of the spring is applied when the door is closed. It is also stated that there is absolutely no noise or violence in the operation of this device. Two sizes of this checking spring pivot are made: No. 1, suitable for doors up to 7 feet 6 inches x 2 feet 9 inches, and 1 $\frac{1}{2}$  to 2 inches thick, and No. 2, suitable for doors up to 8 feet x 3 feet 6 inches, and 2 to 2 $\frac{1}{2}$  inches thick. For outside doors exposed to high winds it is recommended that the larger size spring be used.

## Neely Hand-Forged Butcher Knives.

Richard G. Lewis, Chillicothe, Ohio, in connection with the line of corn cutters,



The Leonard Milk Cooler.



Fig. 2.—Tank Outlet Valve.

fact that this valve is reversible is a point which is emphasized, as it saves the dealer the necessity of keeping a double supply of tank and outlet valves, either being changeable into the other in a moment's time.

## The Improved Adjustable Queen Anne Screen.

The Queen Anne Screen Company, Burlington, Vt., for whom John H. Graham & Co., 113 Chambers street, New York, are sole agents, are putting on the market for the coming season a new screen, which is represented in the accompanying illustration.

It is named the Adjustable Queen Anne Screen. From the cut it will be seen that it is made with a box panel, and the point is made that it can be adjusted without the friction noticeable in other adjustable screens. The fact that it is alike and equally well finished on both sides is emphasized by the manufacturer as making it to be a strictly double faced screen. This screen is made of soft or hard wood, and is stained imitation black walnut or cherry or finished in the natural wood, as desired.



Adjustable Queen Anne Screen.

Nos. 1, 2, 3, 4 and 5 are made of Pine and Bass Wood stained imitation of Black Walnut, with thimbles on one side. Nos. 10, 11, 12, 13 and 14 are made of Maple or Birch stained imitation of Black Walnut, finished in hard oil or shellac, with lifts and face plates. Nos. 20, 21, 22, 23 and 24 are made of Maple or Birch, stained imitation of

is carelessly left open, milk in it will be prevented from souring for a long time. The cooler is placed on the drip tray in the refrigerator in such a manner that the tank is filled with ice water from the melting of the ice above, and after the ice has entirely melted the milk will be too cold to sour for several hours. The cooler is not fastened in the refrigerator, but can be taken out to fill or clean, the window coupling and the faucet also being easily unscrewed and the can removable from the water-tank. A patent has been applied for.

## Bardsley's Checking Spring Pivot or Hinge.

This article is put on the market by the Yale & Towne Mfg. Company, Stamford, Conn., and 62 Reade street, New York, who

formerly of South Salem, Ohio. The trade will appreciate the simplicity and utility of the support, which is the special feature of these knives.

The shipping built on the lakes at and above Buffalo this year amounted to—neglecting smaller craft—5 steel and 1 composite steamer, with an aggregate net tonnage of 11,372 tons, valued at \$1,150,000; 43 wooden steamers aggregating 47,737 tons, valued at \$4,367,000, and 4 wooden sail vessels of 4623 tons, valued at \$309,000, or 53 vessels in all, valued at \$5,817,000. It will be noticed that the average value of the 5 steel steamers is \$101.50 per ton, while the wooden steamers are valued at only \$10 per ton less. The tonnage built in the same locality for the fiscal years 1884-85 and '86, as returned by the United States Commissioner of Navigation, was:

	18
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**Special Notices.****MACHINERY.****FOR SALE—MACHINERY.**

No. 19 Bliss Press, same as new.  
No. 2 Garvin Miller, same as new.  
Garvin Tapping Machine, same as new.  
No. 5 Emery Grinder, same as new.  
12-in. Steepeo double geared Shaper, new.  
15-in. Steepeo Crank Shaper, new.  
15-in. Shaper, Royton & Plummer, new.  
Planer, 20 x 4, Lincoln, second-hand.  
Planer, 20 x 4, New.  
Planer, 30 x 8, Pond, new.  
Planer, 24 x 5, Pond, new.  
No. 1 Garvin 2-Spindle Drill, good order.  
22-in. B. G. S. F. Upright Drill, new.  
28-in. B. G. S. F. Upright Drill, new.  
38-in. B. G. S. F. Upright Drill, new.  
30-in. Upright Drill, B. G. S. F., new.  
32-in. B. G. S. F. Drill, new.  
36-in. B. G. S. F. Drill, new.  
Engine Lathe, 32 x 18, new.  
Engine Lathe, 24 x 16, new.  
Gage Turret Lathe, complete with slide rest, same  
as new.  
Gage and Lathe, excellent order.  
Engine Lathe, 28 x 14, new.  
Engine Lathe, 20 x 10, new.  
Engine Lathe, 28 x 12, new.  
1-in. Engine Lathe, 10 x 12 ft., compound rest, s-hand.  
1-in. Engine Lathe, 16 x 7 ft., second-hand.  
Engine Lathe, 24 x 16 ft., new.  
Engine Lathe, 15 in. x 6 ft., G. S. Screw Cutting.  
Engine Lathe, 18 x 12 ft., power, cross-feed, new.  
Engine Lathe, 18 x 8 ft., power, cross-feed and com-  
pound rest, new.  
Engine Lathe, 20-in. x 8 ft., power, cross-feed and com-  
pound rest, new.  
Engine Lathe, 24 x 16 ft., new.  
1-in. H. P. Hand Lathe with Chuck, s-hand.  
6-in. Double Cutting Off Machine, wood, J. Hanson & Co.  
1-in. Weller Bolt Cutter.  
Engine Lathe, 14 x 6.  
Engine Lathe, 12 x 6.  
Hand Lathe, 13 x 5.

**Cold-Rolled Shafting, Hangers, Pulleys, &c.**

AGENTS FOR  
I. W. Pond Machine Co. Planers; Currier & Snyder  
Drills; Bickford Drill Co.; McMahon & Co. Lathes;  
F. Scott Engine Lathes; John Steepeo & Co. shapers;

**FRASER & ARCHER, 121 Chambers St. N. Y.**

FOR SALE.—Second-Hand Iron and Wood-Work-  
ing Tools.

One Engine Lathe, 15 in. x 6 ft., Blaisdell.  
One Engine Lathe, 16 x 6 ft., Putnam.  
One Engine Lathe, 18 x 6 ft., New Haven.  
One Engine Lathe, 18-in. x 11 ft., New Haven.  
One Engine Lathe, 24-in. x 18 in., Trip'e  
Greated.

One Engine Lathe, 52 in. x 20 ft., left hand.  
One Turning Lathe, 90 in. x 20 ft., triple geared.

One Extension Chucking Lathe, 48 in. x 10 ft.

One Planer, 20 in. x 8 ft., 7 ft. wide.

One Iron Planer, 48 in. x 48 in. x 2 ft.

One No. 2 Bement Cotter and Keyset Cutter.

One 7-in. Niles Radial Drill.

Two Davis Keyseat Cutters.

One 12-in. Sharp Universal Milling Ma-  
chine complete, new.

Two Double Bolt Cutting Machines.

One Bolt Pointing Machine.

One 12-in. H. P. Hand Chuck, slide Rest,  
Box Chuck and Turret that attaches to tall spindle.

One Boiler Plate Planer to plane 13 ft. sheet.

One Lever Punch, capable of punching 13-in. hole in  
1-in. iron, 20 in. from center of stock.

One 12-in. Hammer Steam Hammer, single stand.

One Bement Suspension Drill, single geared.

WOOD WORKING TOOLS.

One Lane & Bodley Car Mortising and Boring Machine.

One J. A. Fay & Co. 3-Spindle Vertical Car Boring  
Machine.

One J. A. Fay & Co. Universal Horizontal Car Boring  
Machine.

One J. A. Fay & Co. No. 4 Tenoning Machine,

double head and double copes.

One Daniel's Planer, 24 in. x 24 in. x 36 feet, wood  
frame.

One S. A. Woods 30-in. Diagonal Planing Machine.

One Single Cylinder Floorline Machine.

One 36-in. Circular Re-Sawing Machine.

One 36-in. Circular Re-Sawing Machine.

One Hattie Creek Machinery Co. Single Spindle Shap-  
ing Machine.

Two Bldg. Style Boring and Mortising Machines,

Buck Pattern.

One 12-in. Iron Frame Saw Table.

One 75 x 12 Westinghouse Automatic Engine, new.

Also a full line of New Wood and Iron Working  
Machinery, Harrington Screw Hoists, Sturtevant  
Blowers and Exhaust Fans, Lathe, Planer and Drill  
Chucks, all styles, Twist Drills, &c., &c.

**U. BAIRD MACHINERY CO.,**  
75 Water St., Pittsburgh, Pa.

**SECOND-HAND MACHINERY.**

One H. P. Corliss Engine.

One 20 " Plain Slide Valve Engine.

One 15 " H. P. Horizontal Engine.

One 40 " Reed Cut off Engine, high speed.

One Supplee Engine.

One New Safety Vertical Engine.

One 10 " Wood, Taber & Morse Port, on wheel.

One Erie City Iron Works Port, on skids.

One 8 " Sharpe Engine and Boiler.

One Marine Boiler.

One 10-ton Ojective Boiler.

One 10-ton Horizontal Boiler.

One 10-ton Vertical Tubular Boiler.

One 10-ton Hot Tubular Boiler.

## Special Notices.

shops; would take charge of steam plant, engines and machinery. Address D. H. BALDWIN, Mechanical Engineer, Gouverneur, N. Y.

**A**S ROLLING MILL MANAGER, by one who is not afraid of work, has 20 years experience from the building to the management; understands the manipulation of men thoroughy, also building and working of open-hearth furnaces. Is an Engineer and Machinist by trade. Address "H. D." Lock Box 1086, Philadelphia.

**A POSITION AS SUPERINTENDENT OF HARDWARE FACTORY** by a thoroughly practical man in every department: thorough in keeping costs and understands the management of men. Refers to present employers. Address "DAUN," office of *The Iron Age*, 66 and 68 Duane Street, New York.

**I WANT A POSITION** January 1st as TRAVELER or in a store, have had fifteen years' experience in the Hardware and Iron and Steel Trade, as buyer and salesman; Good reference. Address "HARDWARE," P. O. Box 450, Waterbury, Conn.

**A GENTLEMAN OF LARGE EXPERIENCE** in business desired position. Complying with Secretary to a corporation or firm where a thorough knowledge of mercantile and manufacturing interests of the country will be available. Address S. E. MILLER, 392 Nostrand Ave., Brooklyn, N. Y.

**A MAN HAVING EXTENDED AND INTIMATE** acquaintance with leading Hardware trade in Eastern and Middle States is open for arrangement with manufacturing party as Salesman. First-class testimonials furnished. Address "NASH," 118 Chambers St., New York.

**C**OMMERCIAL TRAVELER of well known ability, acquainted with the mechanical lines and engin' specialties, is open for engagement January 1st: All references if required. Address "COMMERCIAL," Office of *The Iron Age*, 66 and 68 Duane St., New York.

**A GENTLEMAN WITH TEN YEARS' EXPERIENCE** on the road and a thorough knowledge of the Hardware business desires an engagement January 1st; would not object to Western house; unquestionable references. "MERCAILLE," office of *The Iron Age*, 66 and 68 Duane St., New York.

**A GENTLEMAN WITH A THOROUGH KNOWLEDGE** of the WHOLESALE HARDWARE BUSINESS in all its details will be open to an engagement Jan. 1st. Address "IXL," office of *The Iron Age*, 66-68 Duane St., N. Y.

**BY A MAN OF EXPERIENCE AS SUPERINTENDENT** or Foreman of Iron Foundry; references given. Address "P. O. Box 783," Providence, R. I.

**A ACTIVE AND PUSHING MIDDLE-AGED GENTLEMAN** of extensive experience, 25 years' experience and acquaintances would like to make arrangements with some first class manufacturer as resident manager of their business at Chicago. Best of references and any bond that may be required. Address "MANAGER," care Kelley, Maus & Co., Chicago, Ills.

**A COMPETENT BOOKKEEPER AND EXPERT STENOGRAFHER** would like a position after January 1; ten years' experience; best of references; now holds position with prominent Engin' manufacturer, but finds it necessary to leave for healthier locality on family account. Address "W. A. H.," office of *The Iron Age*, 66-68 Duane Street, New York.

**A GENTLEMAN, OF BORN EXPERIENCE IN THE HARDWARE TRADE AND ROAD,** desires to secure a position with a firm in Ohio, Michigan and Indiana to the Hardware Trade and Manufacturers, on salary or commission. Good references. Will be at liberty after January 1, 1888. Address "CRADOT," office of *The Iron Age*, 66 and 68 Duane Street, New York.

**I WANT A POSITION, January 1, AS TRAVELER** for a first class manufacturer, or special, general or builders hardware; 12 years' experience on the road; located in New England and large retail trade in states. Only those desiring exclusive services of a good salesman at remunerative salary need answer. Unquestionable references. Address "HARDWARE," P. O. Box 524, Marysville, Ohio.

**A BESSEMER MAN** of twenty years' experience, the last ten as Superintendent, which position he now holds, desires a similar position. Understands full making and manipulating all grades of steel, from 10 to 50 carloads. Can handle men closely and effectively and accustomed to plan and direct construction. Address "BESSEMER STEEL," office of *The Iron Age*, 66-68 Duane Street, New York.

**A GENTLEMAN** who has had an extensive business experience and who possesses business abilities of a high order, would like to make an arrangement to take charge of a Chicago agency for steel, glass, iron and metal manufacturing firm. Best of references, both East and West. Address "H.," Office of *The Iron Age*, 66 and 68 Duane Street, New York.

## HELP WANTED.

*Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.*

**TRAVELING SALESMAN.**—Energetic and pushing Salesman acquainted with Mill and Factory Supplies to sell goods in South and West for Western house. Must be experienced in selling goods on the road. State salary expected, with references. Address "W. & G.," office of *The Iron Age*, 66 and 68 Duane St., New York.

**B LAST FURNACE FOUNDER AND ASSISTANT SUPERINTENDENT.** One preferred who has had actual experience in charge, and understands fire brick stoves, boilers and machinery. State age, experience, references, &c. Address "FURNACE FOUNDER," Office of *The Iron Age*, 66 and 68 Duane Street, New York.

**A YOUNG TRAVELING MAN** to make sales for a Pittsburgh iron firm in Baltimore, Philadelphia, New York City and the East generally. Must be one of experience, large acquaintance and come well recommended. Address "TRAVELER," office of *The Iron Age*, 77 4th Avenue, Pittsburgh, Pa.

**FOUNDRY FOREMAN WANTED**: one thoroughly acquainted with Machinery and Water Works Castings, especially Water Pipe. The right man will secure an unusually good position. Address "J. S.," Box 44, Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

**F**OREMAN FOR A FOUNDRY. JOB SHOP. About 40 moulder employed. Address, stating age, references and salary expected. "FOUNDRY," Box 343, Boston, Mass.

**A BOOKKEEPER** in a hardware store located in the central part of New York State; one familiar with the hardware trade preferred; must understand double entry. Address "UNDERLAND," Office of *The Iron Age*, 66-68 Duane Street, New York.

**S**ALESMAN WANTED. A salesman experienced in heavy and builders' hardware to travel in the Northwest for a Chicago house. Address in confidence, stating experience and salary wanted. "MERCHANT," Office of *The Iron Age*, 95 and 97 Washington St., Chicago, Ill.

**T**RAVELING SALESMAN WANTED.—COMPETENT, ENERGETIC AND PUSHING SALES MEN to sell a line of special goods well known to the Hardware, Stove and House-Furnishing Trade; must be familiar with the Hardware Business, and experienced in selling goods on the road, and furnish first-class references. Other lines not conflicting can be taken. Liberal commission. Address "Box 141," Manchester, N. H.

**T**RAVELER TO SELL TABLE AND POCKET CUTLERY to the retail trade in the Eastern States on commission: also one each for New York State, Pennsylvania, Ohio, Indiana and Michigan; only those need answer who have an established trade and who wish to add above goods to their line. Address "CUTLERY," Box 373, Office of *The Iron Age*, 66 and 68 Duane St., New York.

## THE WEEK.

The Hudson River and the great lakes, excepting perhaps the channel between Lake Superior and Lake Huron, are still open and easily navigable, with several steamers yet in commission. It is seldom that such a state of affairs exists so late in December.

Mexico having settled with the English bondholders, now wants to contract a Government loan of \$50,000,000. It is believed that this is the beginning of the development of a scheme to fund the existing national debt in such a manner as will reduce the burdens of government, and that behind it is a group of English and French bankers, who regard the loan as entirely feasible.

Washington reports say that many members of Congress have under consideration amendments to the Interstate Commerce law. Senators Cullom and Reagan were greatly pleased by the report of the commissioners, and these advocates of the original act claim that the report will have influence enough to defeat any attack upon the main features of the law. Senator Cullom desires amendments in the interest of domestic roads which have Canadian competition. The railroads appear to be less urgent than others in asking for changes.

Twenty-inch guns behind steel plates backed with granite were recommended by Lieutenant Weaver, of the Second Artillery, in a paper read before the Military Service Institution, Governor's Island, on the outside line of coast defenses. The 16-inch gun contemplated by the Board of Fortification would, he said, be inadequate against modern ships of war. We must be able to stop hostile vessels beyond the range of their guns. The first point in the defense of New York is the barring of Long Island Sound. Besides, New York must keep the enemy's fleet out of the lower bay, which can easily be done if Congress will give us heavy guns.

General Schofield spoke in approval of the paper.

A large oil firm in Pittsburgh are preparing a case against the Pennsylvania Railroad Company to recover damages for alleged freight discrimination in favor of rival manufacturers. The suit is brought under the act of the General Assembly of 1883, which allows three times the amount of damages sustained from unjust discrimination by railroad companies. In the case now presented the claim amounts to \$124,000 and interest for four years.

A number of business men from Kansas are visiting some of the chief cities in Mexico in hopes of building up a large direct trade between those points and the Northwest.

Advices from St. Petersburg speak of the probability that the import duties on rolled iron will be still further increased.

Dwelling houses numbering about 250 and costing \$1,000,000 have been erected in Bethlehem, Pa., within a year, mainly the result of Government contracts for steel and consequent enlargement of the works.

All competition in express rates between New York and Philadelphia has ceased—the business being now wholly controlled by the Adams Express Company, who have a contract with the Reading Company, recognizing them as the only local shippers of freight. Last November, the United States Express Company bought out the Baltimore and Ohio Express Company, and at once entered into competition for the large through business with the South, West and Northwest. The Reading now gives notice that it will receive no more express matter for New York, alleging breach of faith by invading the territory of its rival, whom it was compelled to protect. When asked how the Company as a common carrier could refuse to receive freight, President Platt, of the United States Express Company, replied, as the story goes, that "we are on friendly terms with the Reading and stopped when requested to do so."

The general managers of the lines between Chicago and the Missouri River, formally adopted the report of the general freight agents arranging for a reduction of freight rates in Illinois, Iowa and Missouri, and of through rates from Chicago to the Missouri River. The reductions are on all classes of freight, and will average fully 25 per cent. below the present tariffs in force. It was agreed that the new rates should go into effect January 1, if the Wabash could be persuaded to postpone action until that date, if not then, on December 20. The reductions, it is said, mean a saving off of \$10,000 per annum in net revenues.

At a meeting of rubber manufacturers in this city, last week, an organization was perfected of what will be known as the Boston Rubber Boot and Shoe Trust. It is stated by those interested that the effect of the trust will not be to the disadvantage of the consumers. Though rubber shoes and boots may, in consequence of the organization, be advanced in price, the quality will be improved by the cessation of competition. The latter have put prices down so low that the companies have been forced to lower the standard of quality.

The Hotel Brighton, at Coney Island, a huge structure, having been partially undermined by the encroaching waters of the Atlantic Ocean, the owners have decided to move the building 600 feet inland, and the work has already commenced. To accomplish this a novel plan has been adopted.

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The building will first be cut up, lengthwise, into three sections. A triple-track elevated railroad will be built under each section, flat cars will be run in, and a dozen or more engines, coupled in tandem, will convey the building to the desired spot. The magnitude of the undertaking can be fully realized when it is stated that the hotel has a frontage of 460 feet and an average depth of 150 feet. It is three stories high and is surrounded by five towers. Its weight is estimated as being 5000 tons. The bathing pavilion, which is 475 feet long by 75 deep, is to be moved in the same manner as the hotel.

The debt of the Argentine Republic is now equal to about 40 per cent. of the total value of the Republic, but a leading Buenos Ayres paper says "it is no more than the country can bear."

The Grievance Committee of the Brotherhood of Locomotive Engineers for the Gould Southwest system met in St. Louis last week, with representatives from every division embraced in the Missouri Pacific Southwest system, and reported that they had no grievance against anybody; everything was working in a harmonious and satisfactory manner.

Merchants in San Francisco are speculating upon the effects which new railroad lines building in all districts on the Pacific coast will have upon trade at that center. To the south of that port Los Angeles and San Diego are growing space, and on the north is Portland, from whence the California and Oregon Railroad now extends as far as the city of Mexico, and other lines are planned in the San Joaquin Valley, upon which important centers will be developed. Fresno is already coming into prominence. The San Francisco *Journal of Commerce* remarks upon this showing: "These roads open up a large extent of wheat, fruit, citrus and olive lands; there will be a great settlement of people all along the lines of road, and in the course of a couple of years a great addition made to the wheat, fruit, grape and other crops of California and Oregon. We will also have to reckon with the beet crop of the future, as it is about to enter largely into our agricultural products. The day for great profits is past for San Francisco. Her merchants and manufacturers must aim to benefit rather by the extent of the trade and the magnitude of their operations than by merely large profits on any particular article."

Virginia responds to the President's message by passing a resolution in the House of Delegates, with only one dissenting voice, directing Virginia's Senators and requesting their Representatives in Congress to secure the repeal at an early day of the entire internal revenue system of taxation, and failing in that, to secure, if possible, the repeal of so much of the system as imposes a tax on tobacco in any of its forms and upon spirits distilled from fruits.

The New York Aqueduct Commissioners opened bids for the construction of the new dam at Sodom, in Westchester County. The lowest was that of Sullivan, Rider & Dougherty, who bid \$366,990.

The four-track system of railroads first introduced in this country by the New York Central Railroad Company is increasing. The Pennsylvania Railroad, which is throughout double tracked, has two additional tracks nearly completed between Philadelphia and Jersey City. Portions of the new track are in use, and in a few months the entire line will be in operation. It also has several miles of four-track line out from Philadelphia and from Pittsburgh and on other portions of the main line. The New York, New Haven and Hartford Railroad has in use 13 miles of road four tracked from the Grand Central Depot to New Rochelle Junction. The 10 miles of road the railroad company are four-tracking and the 13 miles in use make 23 miles out of 73 miles from New York and New Haven four-tracked, and the remaining 50 miles will be provided for as soon as the present work is finished.

The new reservoir of the National Water Works, in Kansas City, is sinking into the quicksand beneath, with probability that the result of five years' labor and an expenditure of \$1,500,000 will eventually drop out of sight. It occupies an old channel of the Missouri River.

Cornelius Vanderbilt has purchased from the Astors 600 lots near Sherman Avenue and 153rd street for about \$750,000, with the proposed object of providing terminal facilities for the New York Central Railroad.

Maine is becoming a great canning State. Eighty canning factories have, during the past year, put up over 14,000,000 cans of sweet corn, besides large quantities of apples, beans, tomatoes and other vegetables and fruit.

By the accidental blowing out of an automatic sprinkler head on the premises of the John Morris Stationery Company, at Chicago, a loss by water of some \$2500 has been caused, and a similar mishap in the Pillsbury Mills, at Minneapolis, has done \$1000 damage. The question in these cases is whether fire or water was most dangerous.

Application was recently made to the Treasury Department, at Washington, for an allowance of drawback on tin plate scrap resulting from the manufacture of imported plate into various articles. It was represented that such an allowance would promote the manufacture of articles for which tin plate is used as material, and that it would be without danger to the revenue, as no domestic tin plate enters into such manufacture. Assistant-Secretary Maynard denied the application, for the reason that it was not authorized by law.

Two propellers on the lakes last season sailed each 40,000 miles, and transported over 75,000 and the other 85,000 tons of freight, without the loss of a single day for repairs.

Andrew Carnegie, in an address before the Century Club, of this city, gave a rosy view of the condition of the United States in every point of view. He had no fear of

coming into more general use. It has been estimated that between 200 and 300 sawmills will be erected within the next six months in the Southern States. Pine land is being bought up both North and South, until it is difficult now to find a large tract within an easy distance of a market.

A large part of this year's fruit yield in California was lost through inability to hire laborers to gather it. The dependence heretofore has been Chinese labor, now driven from

excessive immigration, of the exotic called socialism, or of pauperism. Of the latter he said there was no such thing, except what springs from bad habits or disease. There is no danger in "congested wealth," or even from "surplus money."

The New York Board of Street Opening, of which Mayor Hewitt is chairman, is discussing the difficult question how to relieve Broadway. In course of their investigations the Society of Civil Engineers and the Society of Mechanical Engineers were asked for their views respecting the widening of Elm street as a means of diverting traffic from that thoroughfare. The society first named report that William street near Frankfort and Elm near Worth could be advantageously connected by an intermediate tunnel, the elevation at one point being 34 feet above tide-water. The other society report in favor of widening Nassau and William streets as best calculated to relieve Broadway below Chambers, where the chief impediment to travel exist. It was shown that a proposed new avenue from Ninth street to Maiden Lane might cost as high as \$15,000,000, whereupon Mayor Hewitt expressed himself as in favor of deferring action until next year.

William Mulligan, one of the old iron manufacturers of this country, died suddenly at the Buckingham Hotel, on Sunday, in the 62d year of his age. He was born in New Brunswick, N. J., and was brought up in the iron business. While a young man he became a member of the iron firm of Fuller, Low & Co., of Dover, N. J., and later engaged in business in St. Louis. Twenty-two years ago he went to Saugerties, N. Y., and became a partner in the Ulster Iron Works Company, known as Tuckerman, Mulligan & Co. Two years ago Mr. Mulligan retired from active business, but kept up an interest in the trade with his brother, Cadwalader, R., in Dover, N. J.

The Continental Life Insurance Company, of Connecticut, with liabilities exceeding \$2,000,000 and assets of doubtful value, has gone into the hands of a receiver, and the officers are either fugitives or are under arrest. The number of policies in force was 7544. A serious diversion of assets is hinted at.

The Newark City Silk Mill is being removed from New Jersey to Bethlehem, Pa., on account of frequent labor troubles in the old location.

Harper, the Fidelity Bank wrecker, was found guilty in the court at Cincinnati and was sentenced to 10 years' imprisonment in the penitentiary. A motion for a stay of execution was overruled and the prisoner was taken to Columbus at once.

The French Government, it is announced, will no longer permit the French Cable Company to remain in the cable pool.

The east-bound transcontinental rates were announced last week. Quite interesting will be found the west bound tariff, which is set forth in the table below for the principal classes. The Canadian Pacific differentials are also shown, as applying on New York freight. They are one-third less on Chicago business. The advance over the old transcontinental rates will average about 25 per cent.:

Class.	New York Rate.	Canadian Pac. Diff.	Chicago Rate.
First.	\$4.00	30	\$3.25
Second.	3.20	25	2.55
Third.	2.20	20	2.00
Fourth.	2.20	15	1.75
Fifth.	1.80	15	1.44
Sixth.	1.60	12	1.18

President Cleveland's nominations include these Envys Extraordinary and Ministers Plenipotentiary: Oscar S. Straus, of New York, to Turkey

## MECHANICAL.

## New Press and Slotting Machine.

The Newark Machine Tool Works, of East Newark, N. J., have recently put on the market a number of new machine tools, among them the double pitman press and the slotting machine of which we present engravings on this page.

The press was designed for doing moderately heavy work at low cost and is well adapted for bending, crimping, shearing and punching sheet metal as thick as No. 18, for punching leather, paper, cloth and fabrics of all kinds. It takes 24 inches between the standards, but for working tin or other metal it can be widened to take 30 inches.

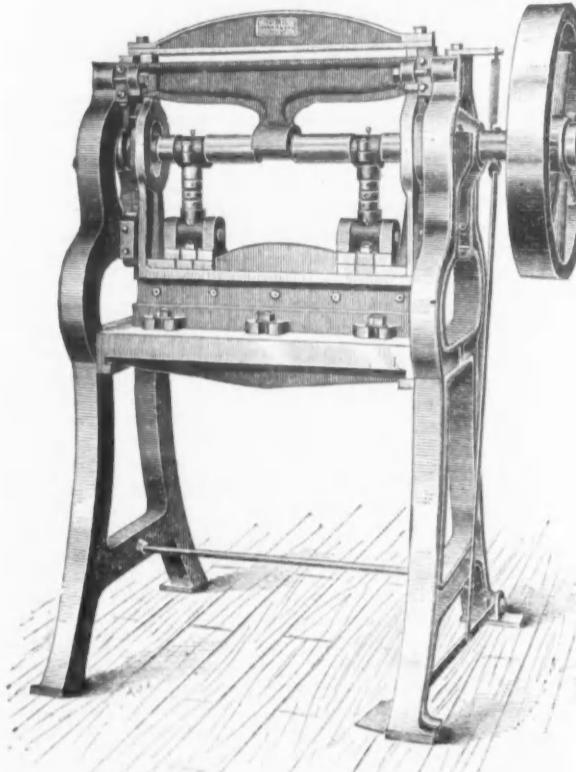


Fig. 1.—Double Pitman Press.

## NEW MACHINE TOOLS, BUILT BY THE NEWARK MACHINE TOOL WORKS, EAST NEWARK, N. J.

The openings in the sides are 14 inches wide and allow the work to be passed through sideways for punching or shearing long strips. The frames are made of great strength around these openings to prevent springing. Holes of any desired size may be made in the bed to let the waste drop through. The principal feature of the press is the arrangement of the guide for the tables. It will be seen that the table is extended above the cross tie, where it is guided and tied by a cross piece. The bearings for the table are provided with gibs so that it can be kept in line without difficulty. These long bearings, so far apart, are features of the greatest importance in die work. The two pitmen give a firm support to the die and prevent any looseness in the slide. The pitmen are adjustable, and all the wearing surfaces have devices for taking up lost motion. The pressure is central. A heavy clutch stops always at the top of the stroke. All shafts and screws are of steel. The stroke is about 2 inches. The fly-wheel weighs about 550 pounds and the weight of the machine is about 2000 pounds.

This is probably one of the smallest locomotives ever made, though many engines are working regularly on a narrower gauge, 18 inches, in shops, steel works, brickyards, &c.

## A New Coal Mining Machine.

We take pleasure in presenting on this page engravings of a new coal mining machine brought out a short time ago and now in the hands of Messrs. Benson & Kendig, 39 and 41 Cortlandt street, New York.

Before entering into a description of the details of the apparatus, we will briefly remark that it was primarily designed to be operated by hand, but it will be readily understood that it is capable, with slight modifications, of being used as a power machine in connection with a suitable motor. The machine consists essentially of the usual rotary cutter, mounted in a frame, and is driven by a number of chains and ropes in the manner described below.

The engravings, which show a sectional side elevation and a plan, will give a fair idea of the nature of the design and the principles involved. The front and rear plates A and A' of the machine are connected by several long bars, as shown, in addition to which a flat plate, B, is secured to them at the middle of their lower edges. On this plate, B, the different moving parts of the machine are arranged. The ends of the plate project some distance through the end pieces A and A' and these are slotted for the passage of a bar, on which the cutter is supported, and for an endless driving chain. The bar, designated by the letter C, carries the cutter head at one end, and its operating mechanism at the other, the cutter-head, or front, end being elevated as shown to such an extent that the bottom of the head is level with the top of the remainder of the bar. The cutter-head itself, D, is composed of a disk having a flange projecting downward and a central hub, which rests upon the head C, a projecting boss upon the latter fitting into a cavity in this hub. A screw, moreover, passes through the center of the hub and the head, and secures a sprocket wheel E, as shown in Fig. 1. The disk, of which the nature of the outline is shown in Fig. 2, is fitted with cutters g, which are slightly wider than the flange of the disk already referred to, so as to cut a channel of sufficient width to permit the entrance of the cutter-head. The hub of the disk D is cogged, and its teeth mesh with the teeth of several cog-wheels H, which are properly secured by screws. On

quired per car for additional cars is about as the above figures show—viz., 2 horsepower each.

## A Lilliputian Locomotive.

A very small locomotive has lately left the shops of Krauss & Co., of Munich. This engine, together with a car and 1 mile of portable track, is intended as a present from the King of Belgium to the Sultan of Morocco. This imperial toy will be laid in the gardens of the palace. The different pieces having necessarily to be carried from the port of landing to the capital by the primitive mode of freight transportation—the pack saddle—lightness of the single pieces was the chief consideration with the builders. The gauge is 23 $\frac{1}{2}$  inches. The heaviest parts of the

these are also fastened supplementary cutter-heads J, whose cutters are of such width as to project slightly below the level of the sprocket-wheel E.

The opposite end of the bar C is cut out so as to leave a space, spanned by a block, C', secured in position by bolts, and having a

the devices for effecting the forward feed and the return. The feeding mechanism being connected to and operated from the same shaft as the cutting mechanism, the rate of forward motion of the cutter will be proportionate to its rate of revolution. While the forward movement of the cutting

it and at the same time moving forward with the cutting mechanism. A rope, x, fastened to the drum S passes forward to the plate A, around a pulley attached to it, and back to a pin, C', upon the block C'. A similar rope, x', is wound upon the drum S in the reverse direction, and thence passes forward to the head C, to which it is fastened.

The operation is as follows: Motion being communicated to the shaft J's sprocket-wheel E is caused to turn and its motion communicated to the sprocket E, thereby operating the main cutter-head D and the small supplemental cutters J, the former cutting the main channel and the latter widening it and permitting the entrance of the driving chain K. It may be observed that the latter operates to clear away and carry off the coal as it is cut away. As the shaft J revolves it turns the worm-wheel U, the shaft R and the longitudinal shaft, carrying one of the bevel wheels, and the clutch T, being moved over into contact with drum S, the latter winds up the rope x and causes the cutting mechanism to move gradually forward. When the cutting mechanism has reached the limit of its movement the clutch T is moved over to the opposite side, and the drum S' being now loose on its shaft, the rope x' is wound up upon the larger drum S and the cutting mechanism drawn back to its original position.

The mechanism for effecting the lateral movement of the machine, and which may be desirable under certain conditions, is illustrated in Fig. 2. In this case the frame of the machine is provided at the bottom with suitable rollers that run upon tracks w w set upon the ground. To the front end of the longitudinal shaft are attached two drums W W and a double acting clutch W, the arrangement being similar to that of the drums and clutch at the rear of the machine, with the exception that the drums are of equal size. Two ropes, y y', are wound upon the drums W W, and their free ends are secured to the opposite ends of the forward rail w. To effect a lateral feed in either direction the clutch W is moved over and caused to engage with the ratchet on one side, thereby causing the drum on that side to revolve and wind up its rope, thus drawing the machine to one side. While this lateral movement is being effected the clutch T should be set midway between the drums S and S', so that neither will be revolved, and there will be no forward or backward movement of the machine. Al-

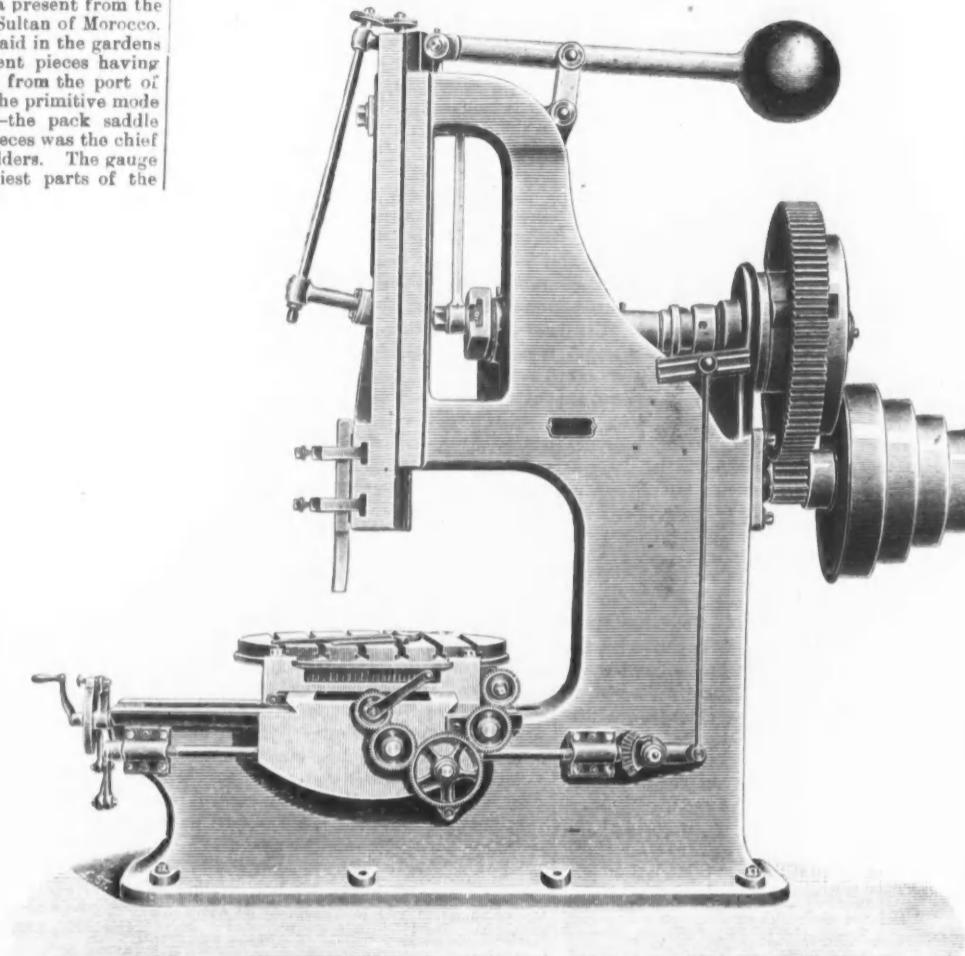


Fig. 2.—Thirteen-Inch Slotting Machine.

slot, through which passes a vertical shaft, J'. To the lower end of this shaft is attached a sprocket-wheel, E', similar to the wheel E already mentioned, and around these two wheels passes an endless chain, K. On the top of the block C' is formed a flange, H<sup>2</sup>, Fig. 2, which embraces and guides a collar through which the vertical shaft J' passes. A bolt and nut, Fig. 1, hold this

mechanism is necessarily slow and dependent upon the power applied, the backward movement is not necessarily so, and, in fact, a rapid return of the cutter-head is desirable. To accomplish this end the following mechanism is provided: To the back of the plate A are secured two brackets, in which is journaled a horizontal shaft, R, carrying two drums, S and S', both loose on the

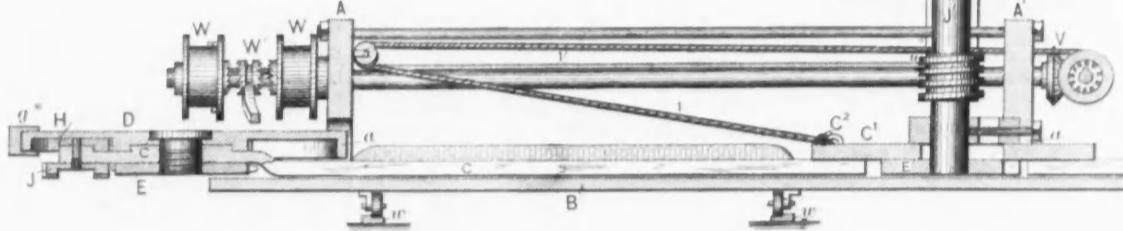


Fig. 1.—Side Elevation and Section.

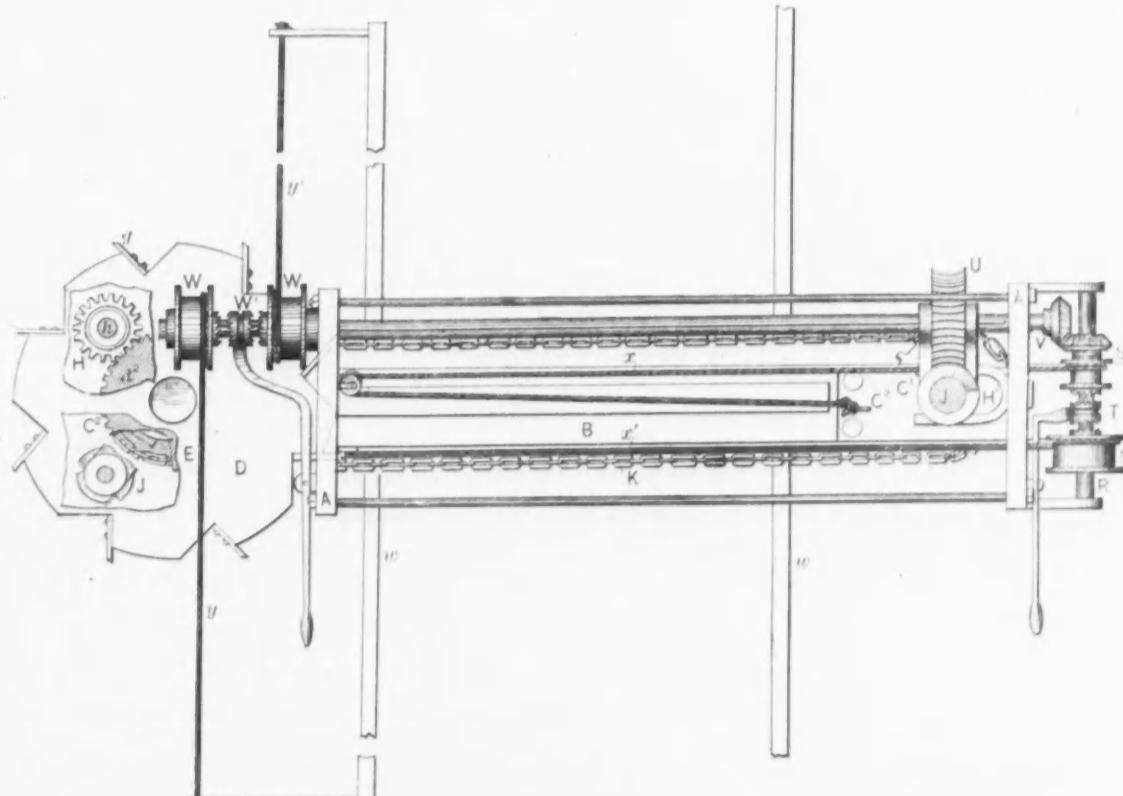


Fig. 2.—Plan.

## A NOVEL COAL-MINING MACHINE, BUILT BY BENSON &amp; KENDIG, CORTLANDT ST., NEW YORK.

According to a recent test made on the Chicago City Railway, it was ascertained that about 36 per cent. of the gross power used in running that road was required to move the empty cable. Figures were made on a day of heavy traffic, and were as follows: 1022 horse power were used to move 300 cars, only 360 of which was required to draw the empty cable. The cars were heavily loaded, perhaps 20 per cent. more than usual, and Secretary Windsor, to whom we are indebted for these facts, assures us that the amount of power required to haul the cable will not exceed 40 per cent. on the average. The Street Railroad Journal says the amount of power re-

quired per car for additional cars is about as the above figures show—viz., 2 horsepower each.

Having described the cutting mechanism and its connections, we will now describe

shaft, and provided with a sliding clutch, T. This is very clearly shown in Fig. 2. Motion is communicated to the shaft R by a worm-wheel, U, and a worm, u, and a bevel pinion on a shaft which runs from end to end of the machine, and is journaled in the plates A and A'. A feather on this shaft extending from the plate A to the plate A' permits the worm-wheel U to move that distance along the shaft, imparting motion to

together the latter embraces a number of interesting features, and seems to meet the requirements of satisfactory work.

The Scranton Steel Company, of Scranton, Pa., has lately made an excellent week's run. In eleven turns they made 637 heats, producing 4212 tons of ingots and turning out 3670 gross tons of rails.

# Trade Report.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, December 14, 1887.

A firm tone obtains in the Iron and Steel trades in all sections. The excitement at Glasgow resulting from the failure of Messrs. Armstrong has subsided, and "warrants" have since moved steadily upward. The closing price to-day was 45/-, against 42/10 a week ago. The shipments of Scotch Pigs continue very steady. Production is still heavy, but the market is little affected thereby, makers' prices having advanced about 2/- on the average during the week. West Coast Hematites show a further rise of 1/- @ 1/6, and Cleveland Pig is 1/- higher. Freight rates have again advanced. The output of Steel Rails is noticeably large at the present time, and makers have not adhered to the higher prices asked last week. Blooms are rather weak, but Billets and Slabs are held higher, and a slight advance is also quoted for Wire Rods.

The situation in the Tin-Plate trade has not changed materially the past week. Prices are very firm, but the business passing is unimportant. The exports to the United States during November were 18,000 tons, against 17,000 tons the corresponding month last year.

The Gwendraeth Plate Works, at Kidwelly, operated by Messrs. J. Chiners & Son, have been shut down. The firm were makers of the Glyn Steel Cokes and Gwendraeth Charcoals. They own nine mills.

With respect to the Tin syndicate operations nothing new transpires. The clique is said to hold fully 10,000 tons, and the belief is general that they stand ready to buy all fresh supplies that may be offered for some time to come. The Copper speculation has been excited, with about £7 advance for the week, and Spelter is again very strong after a temporary set back.

**Scotch Pig.**—The market has been active and more or less excited, with prices to-day as follows:

No. 1. Coltness, f.o.b. Glasgow.	54/-
No. 1. Middlesbrough,	52/-
No. 1. Gartshore,	49/-
No. 1. Langloan,	53/-
No. 1. Carnbroe,	46/-
No. 1. Shotts,	49/-
No. 1. Giengarnock,	49/-
No. 1. Dalmellington,	45/-
No. 1. Eglinton,	45/-

Steamer freights, Glasgow to New York, 10/-; Liverpool to New York, 10/- @ 12/6.

**Cleveland Pig.**—There has been an active market and prices have further advanced. No. 1 Middlesbrough, G. M. B., 36/6; No. 3 do., 33/9, f.o.b.

**Bessemer Pig.**—Prices have again advanced under fairly active demand. West Coast brands, mixed numbers, 47/6 @ 48/-, f.o.b.

**Splegeleisen.**—Business moderate and prices without change. English 20/- quoted at 70/-, f.o.b.

**Steel Rails.**—At concessions from last week's prices there has been a good trade. Standard sections, £4 @ £4. 4/5, f.o.b.

**Steel Blooms.**—Demand is slow and prices are rather weak. We quote at 75/- @ 77/6, f.o.b., for 7 x 7.

**Steel Billets and Slabs.**—The market firm, with demand fair. Bessemer 2 1/2 x 2 1/2 inch Billets, £4 @ £4. 2/6, and Nail Slabs, £4 @ £4. 2/6, f.o.b.

**Steel Wire Rods.**—Demand moderate, but prices held firmly. Mild Steel, No. 6, quoted at £5. 15/- @ £5. 17/6, f.o.b.

**Old Rails.**—There is but little doing, but holders are firmer. Tees quoted at £2. 15/- and Double Heads, £2. 17/6 @ £3, f.o.b.

**Scrap Iron.**—The demand moderate and prices unchanged. Heavy Wrought, 42/6 @ 45/-, f.o.b.

**Crop Ends.**—Moderate demand, but prices steady. Bessemer, quoted £2. 7/6. @ £2. 10/-, f.o.b.

**Tin Plate.**—The market very steady in tone, with demand good. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade	16/9 @ 18/-
IC Bessemer steel, Coke finish	15/3 @ 15/6
IC Steemens	15/6 @ 15/6
IC Coke, B. V. grade	15/9 @ 15/6
Charcoal, Terne, Dean grade	14/3 @ 14/9

**Manufactured Iron.**—There has been a better general demand. Prices a shade higher for Welsh Bars.

	£ s. d.	£ s. d.
Staff. Ord. Marked Bars	6 10 0	7 10 0
" Common "	4 12 0	5 0 0
" Blk. sheet, singles	5 0 0	5 10 0
Common Hoop	5 0 0	5 10 0
Welsh Bars (at Wales)	4 10 0	4 12 0

**Tin.**—Trading has been moderate. Straits closed at spot, and £145/-, three months' futures.

**Copper.**—The market active and excited. Chili Bars closed at £77 @ £77. 2/6; Best Selected, £80 @ £81.

**Lead.**—Market quiet, and barely steady. Soft Spanish, £14. 2/6 @ £14. 7/6.

**Spelter.**—The demand active and the market strong. Silesian, ordinary, £19.

## Financial.

OFFICE OF THE IRON AGE, | WEDNESDAY EVENING, December 14, 1887. |

Tariff discussion and various schemes introduced in Congress have had a somewhat distracting influence in business circles, and this circumstance, together with the natural indisposition to push new enterprises just as the old year is going, causes a lessened move-

ment in the markets for general merchandise. Speculation, too, has come to a halt, except in the market for copper, which is about 7/- lb higher than before the skyward movement commenced. Wheat, after wide fluctuations, shows no radical change; exports light. The Cincinnati *Price Current* figures an aggregate increase of 258,000,000, or 21 1/2 %, compared with the short crop of 1881. Cotton is 1 1/2 lb lower. Wool remains comparatively undisturbed. Coal is again plenty, except in districts dependent on Lehigh Valley, respecting which the operators give no encouragement.

Ex-Secretary McCulloch, in reference to current topics, expresses the opinion that too much importance has been attached to the cry about the alleged gigantic Treasury surplus, for which the Stock Exchange is chiefly responsible. He never knew the price of American produce to be low for lack of money to buy it, but overproduction has frequently forced prices down. Mr. McCulloch refers to the difficulty of discussing national topics from an independent standpoint, and suggests the appointment of a commission divorced from party policy to observe the operation of existing laws and formulate legislation that might be productive of good results. Senator Farwell introduced a proposition to make State, municipal and railroad bonds the basis of national bank circulation, which meets with little favor.

The Stock Exchange markets have had a downward tendency. On Thursday there was a sharp decline, the bears attacking the coal shares, Richmond terminal and other specials, and similar influences prevailed on Friday. On Saturday the market was dull and uninteresting. On Monday there was no news to influence operations, and the tone was generally depressed. On Tuesday there was a partial rally, but bears used the recommendations with good effect, and the tone was unsettled. To-day prices advanced for the single reason that the market was oversold.

United States bonds at the close were as follows:

U. S. 4% s. 1891, coupon	107 1/4 @ 107 3/4
U. S. 4%, 1907, coupon	125 1/2 @ 126 1/2
U. S. Currency 6s, 1895	119 @ 120
U. S. Currency 6s, 1896	121 1/2 @ 122 1/2
U. S. Currency 6s, 1898	123 1/2 @ 124 1/2
U. S. Currency 6s, 1899	125 1/2 @ 126 1/2
U. S. Currency 6s, 1899	127 1/2 @ 128 1/2

The Comptroller of the Currency in his annual report discusses the general subject of bank circulation and shows the great changes that have taken place in extinguishing the 3 1/2 % loan. Between August 12, 1886, and July 1, 1887, nearly \$102,000,000 of 3 1/2 % bonds were surrendered by the banks for redemption, and replacements were made in 4 and 4 1/2 % bonds to the amount of \$20,000,000; while during the same time new banks deposited 4 and 4 1/2 % bonds to the amount of \$4,532,300, and the amounts of these bonds held to secure deposits of public moneys increased by over \$12,000,000. Thus fully \$37,000,000 of 4 and 4 1/2 % bonds were obtained by the banks and transferred to the Treasury within less than 12 months without exciting any speculative advance in the premium of either loan. The Comptroller remarks that "it is of great importance for Congress to observe the perilous contingencies involved in the existence of the present relations between the public debt and the National bank circulation."

The bank statement showed an increase of \$361,475 in surplus reserve, owing to a decrease of \$2,083,900 in deposits. In loans there was a contraction of \$1,473,000. These changes left the surplus reserve standing at \$6,207,200, compared with \$4,080,500 this time last year. While call money is more easily obtainable there is no change at the banks, which are doing nothing in outside paper. Rates on the last-named are: 6 @ 6 1/2 %. At the West there is an active demand. The Chicago Tribune says that for legitimate business purposes there is a fair supply of funds, but persons with speculative schemes to promote are turned away from the banks empty-handed. The packers are large borrowers. Merchants have apparently abated nothing of their claims on their bankers. They seem to need all the funds they can get. Collections are not specially good. That could hardly be expected when in the large and thrifty towns of the Northwest money is lending for legitimate purposes at 10 @ 12 %.

The exports of specie from this port last week amounted to \$597,000, and the total since January 1 is \$16,989,000, as compared with \$46,899,000 for the corresponding period last year. The imports for the same period were \$162,000, making a total since January 1 of \$39,445,000, against \$31,260,000 for the corresponding period in 1886. Foreign exchange continues depressed, and rates are close on to the gold importing point, but a movement of specie in this direction is not probable immediately owing to the large sums falling due January 1 for interest and dividends to foreign holders of our securities.

The trade reports are of a slightly smaller volume of business, but the aggregate is unusually large. The bank clearings of 36 cities last week amounted to \$1,029,212,011—a decrease of 15.3 % as compared with the same time in 1886. Outside of New York there was a gain of 3.5 %, the clearings at this center being only \$651,852,043, against \$860,751,302 last year. Boston also showed a loss of 1 %. The falling off in that city, and in New York, was due to a diminished volume of speculation in securities. St. Joseph reported an increase

of 94.4 %; Omaha, 44.6; Duluth, 42.8; Philadelphia, 14.4; San Francisco, 10.1; St. Louis, 8.9, and Chicago, 8.6 %.

The imports of merchandise at this port during the week were valued at \$7,973,000, of which \$1,868,000 represents dry goods. Since January 1 the total is \$44,952,760, as compared with \$410,809,850 for the corresponding period in 1886 and \$372,054,800 in 1885. The imports of merchandise at this port for November amounted to \$38,300,880, against about \$35,000,000 for the same month last year, and are the largest on record in the history of the trade for any corresponding month. Only for the fact that the specie movement recently has been very small the imports for the year would be in excess of any former total. Even as it stands, there is but one year that outranks it, and in that year it was the volume of specie imported that swelled the amount for 11 months to nearly \$500,000,000. Turning now to the exports, the total for November is small, only slightly exceeding \$27,000,000. The exports of merchandise from this port during the week amounted to \$6,483,418, and the total since January 1 is \$294,460,000, against \$309,080,000 for the same time last year and \$316,733,000 in 1885. The items include 121,000 barrels of flour, 18,342 bales of cotton and 4,648,000 gallons of petroleum.

Upon the silver dollar question the Treasurer says it is a waste to coin and store any more of them at present. The \$214,000,000 now in the Treasury will more than suffice to redeem, as they may be presented, the outstanding silver certificates, or those that can be issued for years to come. The law, he thinks, should be amended so as to authorize the Secretary to issue certificates against the coining value of the bullion bought, and to coin only such number of dollars as he might deem expedient hereafter.

The bullion should be melted into very heavy bars which could not be easily stolen or lost. He recommends the formation of a "silver reserve" in addition to that held against the outstanding certificates sufficient to supply any popular demand for silver.

A list is published of depositors in failed savings banks who are entitled to receive unclaimed dividends, and may get their money if they will take the trouble to ask the Bank Superintendent at Albany for it.

This State now holds something like \$100,000 saved from the assets of these defunct savings banks. From the year 1871 to 1879 29 of the savings banks of the State failed, and their affairs were placed in liquidation by the courts. The total amount of deposits involved by these failures was in round numbers \$15,000,000. Of this sum about \$10,000,000 has been returned to depositors by way of dividends. Twenty-one of the failed savings banks were in the city of New York. The affairs of 13 of these defunct institutions have been closed.

The newly organized Hamilton Bank, capital \$500,000, will soon commence business on Broadway above Prince street; Douglass R. Satterlee, of the Bedford Bank, Brooklyn, president.

A San Francisco dispatch says that a Scotch syndicate has been formed to reorganize the Bank of Nevada, so badly shattered by the disastrous wheat deal of last June.

The failures of the week include that of the commission house D. De Castro & Co., of this city, for the last 30 years in the South American trade. Many of their bills of exchange, previously sold to parties in this country and Europe, have been returned dishonored.

## NEW YORK.

**American Pig.**—Before the publication of the President's message Mr. B. G. Clarke, President of the Thomas Iron Company, had, as he states, made up his mind to open the prices for next season at an advance of \$2 per ton on No. 1 and \$1 on No. 2 foundry—that is, \$22 and \$20. He has now reconsidered his decision, but is not yet prepared to make his announcement. It may be questioned whether there will be any advance at all. The situation is peculiarly mixed. Both consumers and producers all over the country are exceptionally bare of stocks; consumption continues heavy and urgent, while production is falling off somewhat through the blowing out of furnaces on the Lehigh since the 1st inst., and the prospect of further additions to the idle furnaces; costs are high and prices unsatisfactory even now. What pressure there is from the South is small, and the only element of possible weakness from that quarter is the tightness of money in at least one of the Southern iron centers. Buyers have been holding off persistently for a long while, and there are indications that some of them are covering for fear of the rush for iron which may come in January. On the other hand, the situation in rails, affecting as it does the outside furnaces now running on Bessemer pig, is unfavorable, and even now come reports of two furnaces which have been running on that grade turning on Foundry iron. It is not without the range of possibility that furnaces connected with steel works may be turned on to Foundry iron. The feeling is that it will depend entirely upon the opening prices what policy consumers will follow. Whatever they may be, buyers will probably cover a part of their requirements at the prices fixed, and some will be disposed to take their chances on the latter

half of the year, when undoubtedly the new Southern plants will become a more prominent factor in the market. We continue to quote: No. 1 Foundry, \$20.50 @ \$21.50; No. 2, \$19 @ \$19.50 and Gray Forge, \$16.25 @ \$16.75.

**Scotch Pig.**—Little business is reported, and the prices now asked in consequence of the advance in iron and in freights abroad are higher, relatively, than the prices for domestic iron. During the advance about 3000 to 4000 tons in the aggregate have been placed, these sales covering the last two weeks. Importers are finding it a very difficult matter to engage freight room, since a good deal of it is taken by heavy shipments of potatoes. We quote: Coltness, \$21 @ \$21.50; Dalmellington, \$20 @ \$21; Glengarnock, \$20.50 @ \$21; Summerlee, \$20.75 @ \$21; Clyde, \$20.25 @ \$20.50, and Eglinton, \$19.50 @ \$20.

**Structural Iron.**—There have been a number of large contracts closed lately, and a good deal of additional work is in sight. Still the market is not as strong as it has been, and while quotations remain the same some makers show a disposition to offer to "protect



# CURRENT HARDWARE PRICES,

DECEMBER 14, 1887.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at present. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. The prices which goods are quoted at less or higher than the manufacturer's name is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers, at the figures named.

## Ammunition.

Caps, Percussion, W. 1000—	
Spherical, Standard.....	dis 75 \$
Spherical, Water proof, 1-10's.....	50¢ dis 97 1/2
E. B. Trimmed Edge, 1-10's.....	65¢ 25¢
E. B. Ground Edge, Central Fire, 1-10's.....	70¢ 25¢
Double Water proof, 1-10's.....	81¢ 25¢
Marked Water proof, 1-10's.....	82¢ 25¢
G. D. 30¢	
S. B. 30¢	
Union Metallic Cartridge Co.	
F. C. Priming, 50¢	dis 75 \$
F. G. Ground, 50¢	dis 75 \$
Cen. Fire Ground.....	70¢ 25¢
Double Water proof, 1-10's.....	81¢ 25¢
Double Water proof, 1-10's.....	81¢ 25¢
G. D. 30¢	
Eley's E. B. 30¢	
Eley's D Water proof, Central Fire.....	81¢ 25¢

## Cartridges.

Rim Fire Cartridges.....	dis 60¢ 25¢
Rim Fire, Lead cartridges.....	dis 60¢ 25¢
Cen. Fire Cartridges, Pistol and Rifle.....	dis 40¢ 25¢
Cen. Fire Cartridges, Military & Sporting, dis 40¢ 25¢	
Blank Cartridges, except 2 & 32 cal, an addition 10 % over above discounts.	
Blank Cartridges, 32 cal.....	\$1.50 dis 25¢
Blank Cartridges, 32 cal.....	\$1.50 dis 25¢
Blank Cartridges, 32 cal.....	\$1.50 dis 25¢
Blank Cartridges, 32 cal.....	\$1.50 dis 25¢
Primed Shells and Bullets.....	dis 25¢ 25¢
B. B. Caps, Round Ball.....	\$1.00 dis 25¢
B. B. Caps, Conical Ball, Swaged.....	\$1.75 dis 25¢

Primerers, all sizes, and H. L. Caps for Sturtevant Shells.....	90¢ dis 25¢
All other Primerers, all sizes.....	\$1.10 dis 25¢

## Screws.

Paper Shot Shells, 1st & 2d or S. G. qual.....	dis 15¢ 25¢
S. G. or Combination Shot Shells.....	dis 15¢ 25¢
Paper Shot Shells, Club, Rival, Climax.....	dis 15¢ 25¢
Paper Shot Shells, Star Brand.....	dis 15¢ 25¢
Brass shot Shells, 1st quality.....	dis 60¢ 25¢
Brass shot Shells, 1st quality.....	dis 60¢ 25¢
Shot Shells, Club, Rival & Climax.....	dis 60¢ 25¢

Shot Loader, List No. 19, 1887.....	dis 20 & 10 1/2
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## Hammers.

M. C. & W. R. A. E. 11 up.....	\$2.00
M. C. & W. R. A. E. 9 & 10.....	2.25
M. C. & W. R. A. E. 8 & 9.....	2.25
M. C. & W. R. A. E. 7 & 8.....	2.10 dis 20 & 2 1/2
M. C. & W. R. A. E. 6 & 7.....	2.10
M. C. & W. R. A. E. 5 & 6.....	2.00
M. C. & W. R. A. E. 4 & 5.....	1.90
Eley's B. E. 11 up.....	\$1.75
Eley's B. E. 10 up.....	\$1.60

A. V. V. Eagle, Avv.....	dis 10¢ dis 20 & 25¢
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Wright's, Avv.....	9¢
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Vermitage's Mouse Hole, Extra.....	9¢
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Tentors, Avv.....	9¢
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J. & Riley Carr, Patent Solid.....	11 1/4¢
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Millers Falls Co.,	
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Chenev Anvil and Vine.....	dis 25¢ 25¢
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Allen Combined Anvil and Vine.....	dis 20 & 10 1/2¢
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Hooper & Barnes Mfg. Co.,	
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Augers and Bits.	
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Douglas Mfg. Co.,	
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New Haven Copper Co.,	dis 60¢ 10 & 10 1/2¢
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Wm. A. Ives, Co.,	70¢
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French, Swift & Co. (F. H. Beecher),	
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Connecticut Valley Mfg. Co.,	
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Snell's Bits.....	dis 60¢ 10 & 60¢ 10 1/2¢
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Snell's Augers, in fancy boxes.....	dis 20 & 10 1/2¢
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Set of 32 quarters, No. 5; No. 8, &c.,	dis 20 & 10 1/2¢
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Lever's Patent Auger Tongs, 12 in. long.....	dis 25¢ 25¢
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Brass Augers and Bits, New Haven Novelty Co.,	dis 25¢ 25¢
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Patent Auger, 12 in. long.....	dis 25¢ 25¢
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Patent Auger, 12 in. long.....	dis 25¢ 25¢
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Patent Auger, 12 in. long.....	dis 25¢ 25¢
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Patent Auger, 12 in. long.....	dis 25¢ 25¢
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Patent Auger, 12 in. long.....	dis 25¢ 25¢

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## THE IRON AGE.

Lanterns.	
Tubular, No. 9, without Guards.	W. doz \$5.75
Tubular, Lightwre, No. 6, without Guards.	W. doz \$8.50
Tubular, Hinge Tip No. 6, without Guards.	W. doz \$6.25
Tubular, Hinge Tip No. 9, without Guards.	W. doz \$6.50
Tubular, U. S. Safety Lift Wire, no Guards.	W. doz \$5.00
Guards for Tubulars, add 2 doz.	
Police, Small, \$6.00; Med., \$7.25; Large, \$9.75.	dis 20@25¢
Porter's Tin R. R.	\$10 dis 20@5¢
<b>Lemon Squeezers.</b>	
porcelain, W. doz \$6.00, dis 25@30¢	
Wood, No. 2.	W. doz \$3.00, dis 35¢
Wood, Common.	W. doz \$1.75
Dunlap's Improved.	W. doz \$6.00
Sammis'.	No. 1, \$5.25; 2, \$9; 3, \$12. dis 25@30¢
Iona's Patent.	W. gross \$2.50
The "Boss."	W. doz \$1.00
Dean's.	No. 1, W. doz \$6.50; 2, \$8.25; 3, \$1.90
Little Giant.	W. doz \$6.25
Kings.	dis 40@5¢
<b>Linen.</b>	
Cotton and Linen Fish, Draper's.	dis 60¢
Draper's Chalk.	dis 60¢
Draper's Mason's Linen, 84 fls., No. 1.	dis 55¢
1 fls., No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25, dis 25¢	
Cotton Chalk.	dis 55¢
Samson, Cotton, No. 4, \$2; No. 4½, \$2.50.	dis 10¢
Silver Lake, Braided, \$6.00; No. 1, \$6.50; No. 2, \$7.50; No. 3, \$8.50.	dis 25¢
Masons' Linen, No. 3, \$1.50; No. 4, \$2; \$2.50.	dis 45¢
Masons' Colored Cotton.	dis 45¢
Wire Clothes, No. 18, \$3.75; No. 19, \$3.25; No. 20, \$3.75.	dis 25¢
Ventilator Cord, "moso" Braided, \$1.50.	dis 75¢
Coat Buttons, \$1.50.	dis 20¢
<b>Locks, Padlocks, Cabinet Locks, &amp;c.</b>	
"oor Looks, Latches, &c."	
List, Dec. 30, '86, chd Feb. 2, '87.	W. doz \$10 dis 60@5¢
Volts, not often made.	
Resin Hardware Co. (list Jan. 1, '86) dis 40@40@5¢	
Livingston & Co.	dis 60@25¢
Perkins' Burglar Proof.	dis 60@25¢
P. M. E. Co.	dis 60@25¢
Barnes Mfg. Co.	dis 60@25¢
Vale Flat Key.	dis 33¢
Dietz Flat Key.	dis 30¢
L. C. & R. Round Keys.	dis 33@4@10
L. C. & R. Key Latches.	dis 90
Romer's Night Latches.	dis 33¢
Yale new list.	dis 33¢
"Shepardson" or "U. S.,"	dis 30¢
"P. M. E." or "American."	dis 30¢
Seed's N. Y. Hasp Lock.	dis 25¢
<b>Cabinets.</b>	
Eagle, Gaylord Parker and J. List March, '86, revised	
Corbin.	dis 100@100@5¢
Deitz, Nos. 30 to 60.	dis 40@10
Deitz, Nos. 51 to 62.	dis 30@10
Metz, Nos. 86 to 96.	dis 30@10
Stoddard Lock Co.	dis 30@33@4@10
Champion Night Latches.	dis 40
Nearby Mfg. Co.	dis 40@10
Eagle and Corbin Trunk.	dis 25@22
Champion" Cabinet and Combination.	dis 33¢
Yale.	dis 25@22
Rockwood.	dis 25@22
<b>Padlocks.</b>	
List, Dec. 23, '84.	dis 65@10@25@
Yale Lock Mfg. Co. B.	dis 39¢
Cast Iron Padlock.	dis 60@25
Barlow's Eagle Lock Co.	dis 60@25
Romer's Nos. 0 to 21.	dis 25@22
Romer's Nos. 200 to 506.	dis 40@10
A. E. Dietz.	dis 40@10
"Champion" Padlocks.	dis 30@10
Notchicks.	dis 30@10
"Star."	dis 30@10
"Horse Shoe" \$10. dis 30@10	
Barnes Mfg. Co.	dis 30@10
W. C. & W.	dis 30@10
Brown's Patent.	dis 30@10
Scandinavian.	dis 30@10
Fraim's Pat. Scandinavian, new list (low).	dis 60@10
<b>Lumber Tools.</b>	
Ring Peavey, "Blue Line" Finish.	W. doz \$20.00
Ring Peavey, Common Finish.	W. doz \$18.00
Steel Socket Peaveys.	W. doz \$21.00
Wall Iron Socket Peavey.	W. doz \$19.00
Cant Hooks, "Blue Line" Finish.	W. doz \$16.00
Cant Hooks, Mail Socket Clasp, "Blue Line."	W. doz \$16.00
Finish.	
Cant Hooks, Mail Socket Clasp, Common.	W. doz \$20.00
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Steel Socket Peaveys.	W. doz \$21.00
Wall Iron Socket Peavey.	W. doz \$19.00
Cant Hooks, "Blue Line" Finish.	W. doz \$16.00
Cant Hooks, Mail Socket Clasp, "Blue Line."	W. doz \$16.00
Finish.	
Ring Peavey, "Blue Line" Finish.	W. doz \$20.00
Ring Peavey, Common Finish.	W. doz \$18.00
Steel Socket Peaveys.	W. doz \$21.00
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Cant Hooks, "Blue Line" Finish.	W. doz \$16.00
Cant Hooks, Mail Socket Clasp, "Blue Line."	W. doz \$16.00
Finish.	
Ring Peavey, "Blue Line" Finish.	W. doz \$20.00
Ring Peavey, Common Finish.	W. doz \$



## Trade Report.

this conclusion some years since, and the tendency of the trade seems to warrant the inference. We have never been interested to any great extent in the trade, as it was simply a side issue with us, and whenever the market became unsatisfactory in regard to price we discontinued running our machines and devoted our efforts to our own general line.

A brief but pungent answer comes as follows from a manufacturer outside of Illinois: "The margin of profit on Barb Wire has for a long time been so close that in our judgment at least one-half of the original licensees have either failed or turned their plants into some other line of manufacture. The business is going into the hands of the Wire mill."

A large manufacturer in Missouri writes briefly but positively as follows:

In reply to your first question would say we know of but three Barb-Wire companies who have discontinued business, two of them being in Chicago and one in Joliet. We do not know that any factories are now temporarily closed. We are not aware that there is any restriction placed upon any manufacturers of Barb Wire. Such an arrangement was contemplated at one time, but never carried into effect. We know of but one new enterprise started during the past year, and that is the Continental Barb Wire Company, St. Louis. The larger Barb-Wire manufacturers now either draw their own Plain Wire or have intimate relations with some Plain Wire mill.

The remaining letters do not take the same view of the course of the Barb-Wire trade, but their writers believe that circumstances will enable those who have to purchase their Wire to survive. The first one is from a manufacturer some distance west of Illinois, who says:

We are not aware of any changes in the past year that will materially reduce the production of Barb Wire. A very few of the smaller concerns may have withdrawn from the business; I think, however, more particularly for the want of capital than profit. Although the profits are very light to all manufacturers, we are not aware of any failures in the Barb Wire business, except what have occurred in or near Chicago. Most manufacturers are closed at this season of the year. We do not now think of any new concerns going into the business, but we are enlarging our capacity. In our judgment the trade will not entirely pass into the hands of Wire drawers, as they are now selling Plain Wire, many of them, at less than the cost of production. To add Barb-Wire machinery might assist them in unloading their goods, but the increased production would so reduce market prices that the evils arising from this direction would more than overcome the benefits. We think that manufacturers of first-class goods are getting a profit, while those making an inferior article are not making money, and must in time give place to the better grade of goods.

An Ohio manufacturer gives his views somewhat at length, as follows:

We are not aware of any companies closing their works on account of the low prices or unprofitableness, except in Joliet or near vicinity, of one or two small concerns, and, in these cases, it has been where they had no capital and no means of credit for buying the raw material. We do not think that any establishments have discontinued or are now closed where they have the means or can purchase the desired Wire for barbing. The restriction of production by failures has not affected the condition of the trade. Some works have increased their capacity somewhat, but none of them to a large extent, except one concern at Allentown, Pa., and one factory in Cleveland. The capacity of production is fully equal to the demand. We are not aware of any new works being started. We do not think that the trade is passing into the control of Plain Wire mills. It has always been run quite largely by Plain Wire works, or those having intimate relations with such works. Some Barb-Wire companies have within a year or two added to their business facilities for drawing Plain Wire, but, as we believe, have received no advantages by doing so.

The following cheerful letter comes from an Illinois manufacturer:

Last year, and thus far this year, our trade has been excellent, never better. We do not find the trade passing into the hands of Wire drawers. It may be possible that as new locations are selected for manufacturing Barb Wire it will compel Wire drawers to seek them, for the Wire trade has a Westward tendency, and freights will determine location, other things being equal. There is every reason to believe the Wire trade to be in splendid condition. Of course prices are low and margins narrow, and if some one will only put forward a plan to increase the width of this margin we will feel like Tennyson's brook:

"For men may come and men may go,  
But we'll go on forever."

Otherwise will quit when our time comes.

And here is another cheerful letter from a manufacturer in the Northwest, who buys all his wire: "So far as our own business is concerned, we have had a prosperous year. We are one of the small concerns, and can only answer for ourselves. We are not inclined to close up."

The last letter in this series is from a manufacturer whose works are located in Illinois, and who has decided opinions on the subjects which he discusses. It is as follows:

We think if the large Wire mills take to barbing their product they will have to charge a legitimate profit on barbing as well as upon drawing their Wire, something to pay them for the additional capital used, risk incurred and bad debts made in selling the Barb Wire. We think some of the

larger manufacturers of Barb Wire who have begun drawing Plain Wire have sold their Fence Wire without profit on the barbing in order to freeze out smaller manufacturers who bought their Plain Wire and depended entirely upon the barbing. The impression has seemed to prevail among certain big (headed) manufacturers that they could crowd out the smaller fellows. They have overlooked the fact that a man with an output of only 500 tons has but a small load to carry, that he can shut down as soon as there is no profit and wait for better times. They do not seem to see that the man with only 100 tons of Fence Wire piled up can make quotations as low as anyone and may establish a market for 100,000 tons to be sold by them. Perhaps their freezing out process may have caused the small man to realize at a ruinous loss, and so put the market at a loss for themselves. It is alleged that the country is now forced up and the future demand will be very light. The fact is that the fences first built are already being removed. Fence will not last forever. Ranches will be divided into farms and fenced up. In the early history of the barb fence business there was large profit; any man could make money in it. Men without business capacity, and unprincipled enough to be willing to use Washburn & Moen's patents without compensation, went into the business. The trade has since suffered from their bad management and their distrust and suspicion of one another, destroying all confidence, and placing manufacturers at the mercy of buyers. What is wanted is a little more common sense, a good deal more confidence in each other, co-operation between large manufacturers with the smaller ones, instead of crowding them; the same also with the Plain Wire mills. There is a large capital invested—Fence Wire of better quality than ever is now being made—the cost of making has been and is being daily reduced, weak and dishonest men are going to the wall. On the other hand, the country needs Barb Wire; it is a great staple and will be sold in large quantities and at fair profit. The fence business is going to continue to be one of the large interests of the country.

We shall be glad to have the views of other Barb Wire manufacturers on points suggested by the above communications, or with relation to other questions which seem of sufficient importance to the trade to be discussed in our columns.

**COPPER.**  
The following advanced prices on Manufactured Copper were adopted by the manufacturers December 9:

*Sheet and Bolt Copper.*

Sizes of sheets.	Per square foot.									
	64 oz. over.	32 oz. up to	32 oz. up to	16 oz. up to	16 oz. up to	16 oz. up to	14 oz. up to	12 oz. up to	10 oz. up to	8 oz. up to
Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	Cts. per lb.	
Not wider than 30 in. & not longer than 72 in.	25	25	25	26	27	28	31	33		
Not wider than 30 in. & longer than 72 in.	25	25	25	26	28	30	34			
Not wider than 30 in. & not longer than 96 in.	25	25	25	27	29	33	36			
Not wider than 36 in. & longer than 96 in.	25	25	26	28	30	34	38			
Not wider than 48 in. & not longer than 96 in.	25	25	27	29	31	35				
Not wider than 48 in. & longer than 96 in.	25	25	28	30	32	35				
Not wider than 60 in. & not longer than 96 in.	25	25	30	32	37					
Not wider than 60 in. & longer than 96 in.	25	25	30	32	37					
Not wider than 60 in. & not longer than 144 in.	25	25	31							
Not wider than 84 in. & longer than 96 in.	27	28								
Over 84 in. wide	28	30								

All Bath Tub Sheets.... 16 oz. 14 oz. 12 oz. 10 oz.  
Per pound..... \$0.28 0.30 0.32 0.35  
Bolt Copper,  $\frac{1}{4}$  inch diameter and over, per pound..... 25¢  
Copper in thicknesses, 14 oz. and less, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles over 10 inches diameter, up to 96 inches diameter inclusive, 5 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Circles over 96 inches diameter, 6 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

Segment and Pattern Sheets, 3 cents per pound advance over price of sheets required to cut them from.

Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

*Tinning.*

Tinning Sheets on one side, 10, 12 and 14  $\times$  48, each.....

Tinning Sheets on one side, 30  $\times$  60, each.....

For Tinning Boiler Sizes, 9 inches, 14  $\times$  60, each.....

For Tinning Boiler Sizes, 8 inches, 14  $\times$  56, each.....

Tinning Sheets on one side, other sizes, per square foot.....

For Tinning both sides, double the above prices.

*Planished Copper.*

14 x 48, Per pound.

14 and 16 ounce and heavier.....

By the case.....

12 ounce and lighter.....

By the case.....

Bolts sizes—7 inch, 14 x 52; 8 inch, 14 x 56;

9 inch, 14 x 60;

14 and 16 ounce and heavier.....

By the case.....

(All sizes not over 20 inches wide.)

24 x 48 and 30 x 60,

14 and 16 ounce and heavier.....

12 ounce.....

*Planished Brass.*

Same price as Planished Copper.

*Tinning.*

14 x 48, by the case..... Per sheet, 8¢

Bolts sizes, 7 and 9 inch..... Per sheet, 12¢

Other sizes not larger than 30 x 60..... Per sheet, 25¢

14 x 48, less than case..... Per sheet, 10¢

Bolts sizes, 9 inch..... Per sheet, 15¢

Larger than 30 x 60..... Per square foot, 5¢

Copper Bottoms, Fins and Flats.		Per pound.
14 ounce to square foot and heavier.	25¢	
12 ounce and up to 14 ounce to square foot.	20¢	
10 ounce and up to 12 ounce.	30¢	

Circles less than  $\frac{1}{2}$  inches diameter 3 cents per pound additional.

### STATE OF TRADE.

The following advices received from Hardware houses in different parts of the country will be of interest, as giving information as to existing conditions of business, and the views of intelligent merchants as to the outlook in the several sections to which they relate:

### Dakota.

**BUFFALO GAP.**—We are still suffering from the reaction which naturally followed the abnormal growth of nearly all the towns in this section on the completion of our first railroad. Until the fall of 1885 our nearest railroad point was at the Missouri River, 200 miles east, to which an unclassified rate of 75 cents per hundred from Chicago was made for Black Hills business, in addition to which it cost from \$1.75 to \$4 per hundred for wagon transportation, depending largely on the condition of the roads. From November to June it was almost out of the question to haul freight, making it necessary to ship a six months' stock in the fall. Very large stocks had to be carried, but as few consumers did or could ship their own supplies, the dealer had a monopoly.

Competition not being very strong, everybody made money, 25 to 50 per cent, being the usual profit on staples, and 50 to 300 per cent. on shelf goods. Still we were not satisfied. Forty thousand people were isolated from the rest of the world by the great Sioux Indian reservation on the east, and the vast cattle ranges of the Northwest stretching west to the Rocky Mountains. From the first settlement of the hills in 1876 until the C. and N. W. R. R. was built in 1885 there was a constant and unanimous cry for railroad communication with the outside world. For with their advent it was expected that an era of prosperity would begin, as lower freight rates and increased facilities would stimulate a development of low grade mines, and fill the country with immigrants, in which we have to a large extent been disappointed so far.

In the first place, all figured on an unusual demand for all classes of merchandise and everybody established in business bought heavy stocks of goods, while hundreds of Eastern men followed the railroad in to compete for the immense trade said to be here. As a result new towns sprang up and hundreds of new houses began business. More goods were shipped in six months than could be sold in two years. Of course this excessive competition cut prices and divided trade until very few people made any money. Then the railroad charged exorbitant rates—\$1.50 to \$2.75 from Chicago on everything that could not be produced here, while on all of the products of the country a very low rate was made, enabling grain, flour and lumber to be shipped in, to the detriment of the ranches, millers and sawmill men, who were able to nearly supply the local demand. A great many immigrants did come in, but it took about all they had to get here, and they cannot buy much until they grow a crop or two.

However, I am satisfied that the bottom has been reached, and, in my judgment, the future outlook is very encouraging, as the large crop of this season has put the ranchers in better shape than they have been before in a long time, while the constantly increasing output of the gold and silver mines, amounting to nearly \$5,000,000 annually, and the regularity with which the best properties are declaring dividends, is rapidly putting our mining industry on a solid substantial basis, with but little of the speculative wild-cat operations that have characterized mining matters during the early history of this country. Our extensive tin interests have been developed but very little yet, but increased activity is being manifested in that direction, and by spring extensive operations will undoubtedly be inaugurated. The Tin Mountain Company, of Chicago, are now erecting reduction works on a valuable property recently purchased by them near Custer, while a syndicate of New York and London capitalists have bonded the most promising locations in the hills, and will probably soon effect a purchase of sufficient property to warrant them in beginning work on a large scale. Several marble and stone quarries are being opened at Buffalo Gap, while extensive coal fields are being developed on Hay Creek. With the advent of at least one more road during the coming season the discriminations against us in freights will be equalized and adjusted by competition.

The excessive overstocks carried by nearly everybody during the past two years have been worked down to the legitimate demand of the country. Over half of the Eastern men who came in with the railroad have been frozen out, leaving the trade in a good healthy condition, and when prosperous times come again, as they surely must in the spring, everybody will be ready to profit

**Hardware Dealers Take Notice,**

and buy where you can get the best quality at the lowest price, thereby not only satisfying your customers, but also putting money in your own pocket.

Our Eureka Patent Flexible Back Saws, the teeth of which are hard, the back being soft, thereby preventing them from breaking in two, have been greatly improved and are giving the best satisfaction. Our Crescent brand of Hack Saws are hardened all through with uniform temper, and are the best Hack Saws so tempered.

We are now preparing to supply the wants of the trade according to their preference. Hardware Dealers run no risk by buying from us either our Eureka or Crescent brand of Hack Saws on our recommendation, as we give them the option of returning the first lot to us at our own expense any time within three months from date of invoice. Correspondence solicited.

**Henry G. Thompson & Sons,**

Cor. Elm and State St., New Haven, Conn.,

— MANUFACTURERS —

Flexible Back Band Saws for Cutting Metals,  
Hack, Meat and Kitchen Saws and Frames.

SEND FOR CIRCULAR.

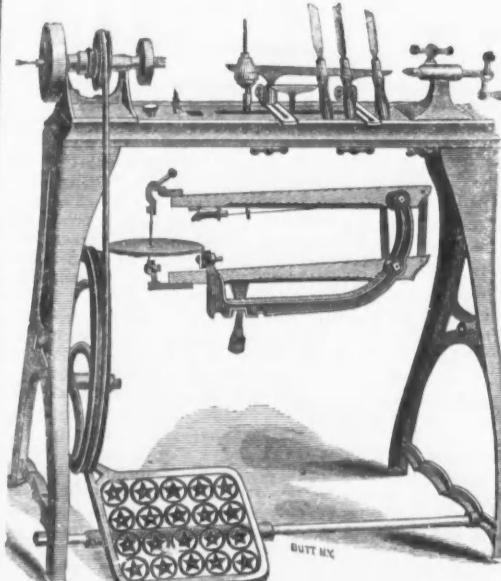
BRANCH OFFICE, 51 Leonard St., New York City.

JOHN W. McCLELLAN, Pres. CHARLES R. FOWLER, Vice-Pres. HENRY S. LANPHER, Sec'y & Treas.  
Factory, SEYMOUR, CONN.  
85 Beaver St., New York.  
MANUFACTURERS OF  
**TIN ZINC,**  
W. J. WILDER'S PATENT, March 10th, 1885.  
A New Metal especially adapted for Roofing, Lining Refrigerators, the Manufacture of Britannia Ware and all Articles where Spun Metals are Required. An excellent Substitute for Tin Copper and White Metals.

The F. F. ADAMS CO.,  
ERIE, PA.  
MANUFACTURERS OF

**Rat and Mouse Traps,**

Step and Extension Ladders,  
Clothes Bars, Clothes Wringers, etc.  
SEND FOR CATALOGUE.

**A. E. DEITZ. GOODELL LATHE.**

Many kinds of Scroll Saws have been put on the market by ourselves and other manufacturers during the past twelve years. Of them only a few are good enough to remain in demand. The call now is for a well-made, practical machine, and all second-class ones are of slow sale.

Those who want a good Lathe with Scroll-Sawing Attachment and all Tools and Improvements to the very latest moment will buy the Goodell Lathe.

Those who want only a Scroll Saw with Drilling Attachment, Rubber Blower and Lever Clamp will prefer the Rogers saw.

These two machines are taking the place of all others, and are now the most in demand throughout the world.

No dealer can make a mistake by laying in a stock of them. A hour Christmas time they are wanted in every town, and will make business lively at this otherwise dull season.

We also keep a full stock of Designs, Wood, and all other Scroll Sawing goods.

Price of Goodell Lathe, complete, \$12.00.

Price of Rogers' Saw complete, \$3.50.

**MILLERS FALLS Co.,**

93 READE STREET, NEW YORK.

**CHRISTMAS NOVELTIES.****Umbrella Stands, Waste Paper Jars**

"Pa-Crusta" Umbrella Stand. Waste Paper Jar. "Full Finish" Umbrella Stand.

Sold by all First-Class Dealers in Crockery, Housefurnishing Goods, Stationery, &c.

**Union Indurated Fibre Co.,**

110 Chambers St., New York. 39 Wabash Ave., Chicago.

PORLTAND, ME. MECHANICSVILLE, N. Y.  
WATERTOWN, MASS. OSWEGO, N. Y.  
SKOWHEGAN, ME. LOCKPORT, N. Y.  
WINONA, MINN.

Double Acting Spring **BUTTS** SABIN'S LEVER DOOR SPRINGS  
Spring Coil, and Sabin's Volute Springs  
For various purposes made to order.

**WALPOLE** **MILLS.** SABIN MACHINE CO., Montpelier, Vt.

**EMERY**

SOUTH WALPOLE, MASS.

# Trade Report.

## Cleveland.

CLEVELAND, December 12, 1887.

**Iron Ore.**—About 200 tons of Ore came down by rail during the past week, and 23,400 tons were sent forward to the furnaces. For the same week last year the shipments were 18,400 tons. The official report of the season lake shipments shows that the Marquette range sent down 1,764,251 tons; the Menominee, 1,151,711; the Gogebic, 1,092,428, and the Vermillion, 390,467; a total of 4,398,847. Last year the total shipments were 3,793,176 tons, the gain this year being 905,671 tons. There is a scarcity of cars for transporting the Ore to the furnaces, and the furnace men are complaining. There is also a lack of Coke, several furnaces being entirely out. The market is inactive, no sales of any kind having occurred during the past seven days. Prices remain very firm at \$6.75 @ \$7 for No. 1 Specular and Magnetic Ores; \$5.75 @ \$6 for Bessemer Hematites, and \$5.50 @ \$6 for Gogebics.

**Pig Iron.**—Furnace men seem less inclined to make concessions than at any time since August. The market has a very firm tone, the prevailing quotations being strictly adhered to. Buyers, however, seem to be waiting for January, and some substantial sales may be expected during that month. As much Pig Iron is being sold as could reasonably be expected at this time of the year. Soft Foundry Iron is inquired after with some eagerness, a sale of 650 tons at \$20.50, cash, at the furnace being reported, with a request for 1200 tons more at the same price. Lake Superior Charcoals are firmer, quotations ranging from \$23 to \$24 per ton for all numbers. Cars for delivering Iron are difficult to obtain.

**Old Rails.**—Considerable quantities of Rails have been purchased by local buyers at figures said to be below \$24, while a round lot of wheels brought \$20, cash.

**Manufactured Iron.**—Bar Iron is quoted at \$1.80, although sales have occurred below that figure. Sheets have been bought in such quantities recently that a scarcity, especially of the small gauges, is reported. No. 24 is quoted at \$3 and No. 27 at \$3.50 @ \$3.60, 60 days, 2% off for cash.

**Nails.**—The market is only fairly active, Iron Nails selling at \$1.90 @ \$2, 60 days, 2% off for cash. Steel Wire Nails have declined to \$2.90. Only a limited business is looked forward to for the next two months.

**Barb Wire.**—Manufacturers are anticipating a good spring trade. They quote Galvanized at \$3.75 and Painted at \$3.15, f.o.b. cars at the mills.

## Cincinnati.

Office of *The Iron Age*, Fourth and Main Sts., CINCINNATI, December 12, 1887.

**Pig Iron.**—An easy tone has prevailed for Pig Iron during the past week, but there has been a good demand, and fair sales, resulting in a more confident if not a firmer tone at the close, with the promise of higher prices, or rather of a recovery of prices, stronger than for several months. The sales consummated by Cincinnati agents during the past week aggregate upward of 8000 tons, made up of Southern, Ohio and Lake Superior Iron, Coke Iron selling in rather larger proportion than Charcoal grades; 2000 tons No. 2 Southern Coke Foundry iron sold at \$19.50, but it is claimed that the same grade may now be purchased at \$19, if not less; 1000 tons No. 1 Ohio Foundry at \$20.10 and 1000 tons Mahoning and Shenango Valley Iron at \$20.75, cash, here; 1000 tons No. 2 Southern Mill at about \$16.75 and 1000 tons No. 1 Mill at \$18, but smaller sales of this latter grade are reported as low as \$17.50; 600 tons Mottled Iron is reported sold at \$18.75 and 500 tons Lake Superior Car-Wheel at \$23.50, cash, here. In addition to these specified amounts there are several other trades of moment in the process of completion. The buying movement of the past few weeks is explained that as there was a general belief in an influx of buyers in January the conclusion was forced upon consumers that there would be a scramble to place orders first, and therefore to secure favorable deliveries, prices already being low, the decline having been recognized by the furnaces, it was the part of wisdom to anticipate the general movement. The sales which have been quoted extend in deliveries from January to June, and one or two embrace almost the entire year; the first installments upon the contracts commencing in various times in January, February and March. The quotations for cash here, f.o.b., are as follows: Hot-Blast Foundry Iron—Ohio and Southern Coke, No. 1, \$20 @ \$20.50; do., No. 2, \$19 @ \$20; do., No. 3, \$18 @ \$19; Ohio Soft Stonecoal, No. 1, \$20 @ \$20.50; do., No. 2, \$19 @ \$20; Mahoning and Shenango Valley Coke, No. 1, \$20.50 @ \$21; Hanging Rock Charcoal, No. 1, \$23 @ \$24; do., No. 2, \$22 @ \$23; Tennessee and Alabama Charcoal, No. 1, \$21 @ \$21.50; No. 2, \$19.50 @ \$20.50; Forge—Strong Neutral Coke, \$17 @ \$18; Mottled, \$16 @ \$16.50; Cold Short, \$16 @ \$17; Car-Wheel and Malleable—Southern Car-Wheel Iron, \$23 @ \$24; Hanging Rock, C. B., \$24 @ \$25; Lake Superior Malleable, \$22.50 @ \$23.50.

**Old Rails and Wheels.**—There has continued to be free offerings of Old Rails at \$23 and under, but only moderate sales are recorded; Old Wheels, too, have been slow and easy with moderate transactions at \$20 @ \$20.50, cash.

**Manufactured Iron.**—The only feature of interest in this line is the attempt of purchasers to obtain Iron bought promptly upon time as contracted for, but all the mills are stopped either for repairs or for the lack of fuel. There is a more ample supply of coal at the close, but prices are still high. Bar and Sheet Iron: Common Bar Iron, 2¢; Charcoal Bar Iron, 3¢; Sheet Iron, boiled, Nos. 10 to 27, 2.60¢ @ \$3.30¢; Sheet Iron, Charcoal, Nos. 15 to 25, 3½¢ @ \$4.25¢ per lb.

**Nails.**—The demand has continued moderate and the market easy. The inside rate for carlots, 10d @ 60d, being \$2 @ \$2.10, and do., Steel, at \$2.10 @ \$2.20 per lb., and other sizes at proportionate rates.

## St. Louis.

ST. LOUIS, December 12, 1887.

**Pig Iron.**—The situation is an interesting one both to buyers and sellers, owing to the uncertainty of what the near future will reveal. The surplus on hand at the furnaces is small, and should a heavy buying movement commence it would undoubtedly stiffen prices. On the other hand, if consumers continue to buy from hand to mouth, as the bulk of them have done for the past 60 days, we can see nothing just now that is likely to cause a scarcity. Inquiries are becoming more frequent, and the outlook is not a discouraging one. Prices are as follows on cars at St. Louis:

	Southern Coke.
Foundry.....	\$20.00 @ \$20.50
Mill.....	17.50 @ 19.00
Southwest Ore.....	\$20.50 @ \$21.50
Old Rails.....	22.75 @ 23.50
Old Wheels.....	20.00 @ 20.50
Connellsville Coke at East St. Louis.....	6.15

## Louisville.

LOUISVILLE, KY., December 12, 1887.

**Pig Iron.**—The situation has not changed materially from that of last week. The general disposition of buyers is to defer purchasing until after the end of the year, although most of them seem to understand that prices will advance. In their desire to close the year with low stocks on hand they are willing to incur the risk of paying higher prices for the remainder of their season's supply. There seems to be much diversity of opinion among furnaces as to the advisability of selling for delivery extending over greater periods than 60 days. Some furnaces have absolutely declined to book good orders running for eight or twelve months; while others have sold the whole of their product, particularly in mill grades, for the entire year of 1888. The prices asked by furnaces are now objected to by buyers, but for reasons above stated the latter are not purchasing. It is now expected that the Ohio and other rivers will soon be navigable, and, if this be the case, it will enable the delivery of various lots which have been sold during the fall subject to resumption of navigation. There still remains considerable Iron at furnaces which depend upon water for transportation, and this Iron is now being freely offered at quoted prices. Irons which were reported last week as having been sold at a sacrifice to clear out furnace yards can now only be had at an advance of \$2 per ton.

**Southern Coke.**—\$20.00 @ \$20.50  
" " " 19.00 @ 19.50  
" " " 18.00 @ 19.00  
  
**Hanging Rock, Coke, No. 1 Foundry dry.** 19.50 @ 20.50  
  
**Hanging Rock, Charcoal, No. 1 Foundry.** 22.50 @ 24.00  
**Southern Charcoal, No. 1 Foundry.** 30.50 @ 21.50  
**Silver Gray, different brands.** 17.50 @ 19.00  
**Southern Coke, No. 1 Mill, Neutral.** 16.50 @ 17.50  
" " " 16.5 @ 17.50  
" " " 16.5 @ 17.50  
**White and Mottled, different grades brands.** 15.00 @ 15.00  
**Southern Car-Wheel, other brands.** 24.00 @ 25.00  
**Hanging Rock, Cold Blast.** 24.00 @ 25.00  
**Warm Blast.** 20.00 @ 21.00

**W. B. BELKNAP & Co., Louisville,** report as follows, under date of December 12, 1887: The market is in a somewhat mixed condition. All the manufacturers profess to be overrun with orders, and in verification of this it is with great difficulty that assorted or large orders for staple goods are filled with reasonable promptness. At the same time, whether for fear that the situation is too good to last, or discounting the action of the present Congress, committed as it seems to be to reduction of the tariff in some shape or in some degree at least, there is more or less of a disposition to sell freely. The approach of the holidays has had the usual effect of turning the demands for goods on to small counter stuff, and there is some decrease in the demand for the heavy staples.

**Bar Iron.**—This is firmly upheld by all the manufacturers, who are using, however, the old-time threat of closing down shortly to induce immediate orders. There is some prospect for coal for Cincinnati and the lower river points, which will probably set the wheels in motion again there, and may make the market a little easier.

**Sheet Iron.**—All the gauges, both heavy and light, are far from plenty; the market is absolutely bare of Stove Pipe gauge still, and the leading sizes of Corrugated are also short. The production of Sheet this season has been singularly deficient, and if the demand is not soon overtaken next year's contract will be coming on in addition to the present unsatisfied one.

**Steel.**—The new prices made by the Steel Association seems to receive general approbation. A better price is obtainable for Tool and Cast Spring. The change in classification may be noted under date of December 1.

**Nails.**—The low price of Wire Nails is holding down the Cut Nail market, which seems incapable of recuperation above the very low figures it has been at now since last spring.

**Wire.**—There is a fair amount of Wire selling, but no speculation. Quite a number of weaker makers have gone to the wall, but where they have gone down some others of more importance seem to be coming to the front.

**General business is in good shape, and, while failures may appear more numerous than it is comfortable to contemplate, we must remember that a large number of new firms have gone into business under the stimulus of the last year or two with insufficient capital, with crude methods and in ill-considered localities. It is not at all surprising that some should fail.**

## Detroit.

DETROIT, December 12, 1887.

**CHARLES HIMROD & Co., dealers in Iron, Detroit, Mich.,** report under date of December 12, 1887, as follows: In Detroit proper there has been comparatively little buying during the past week, but our local made Irons have been in strong demand, the orders being more numerous than large in volume, making in the aggregate, however, a considerable tonnage. It would seem as if buyers generally were evening up their stocks to carry them until they take inventory, which the majority do about the first of the year. Notwithstanding this fact one or two of the Car-Wheel makers have considered it wise to place orders for the first four months of next year, and we know of orders to the extent of 4000 tons L. S. Charcoal Iron which have thus been placed. The market remains steady, all business commanding full prices, and quotations continue as follows:

	Lake Superior Charcoal, all numbers.	Standard Ohio Blackband.	South Standard Ohio Blackband.	Southern No. 2.	Southern Silvery.	Jackson County, Ohio, Silvery.	American Old Iron Rails.	Old Wheels.
	\$22.00 @ \$23.00	\$22.00 @ \$23.00	\$22.00 @ \$23.00	\$20.00 @ \$21.00	\$20.00 @ \$21.00	\$22.00 @ \$23.00	\$24.00 @ \$25.00	\$20.50 @ \$21.50
	22.00 @ \$23.00	22.00 @ \$23.00	22.00 @ \$23.00	20.00 @ \$21.00	20.00 @ \$21.00	22.00 @ \$23.00	24.00 @ \$25.00	20.50 @ \$21.50
	22.00 @ \$23.00	22.00 @ \$23.00	22.00 @ \$23.00	20.00 @ \$21.00	20.00 @ \$21.00	22.00 @ \$23.00	24.00 @ \$25.00	20.50 @ \$21.50
	22.00 @ \$23.00	22.00 @ \$23.00	22.00 @ \$23.00	20.00 @ \$21.00	20.00 @ \$21.00	22.00 @ \$23.00	24.00 @ \$25.00	20.50 @ \$21.50

**IRON ORE.**—\$3.00 @ 4.50  
\$22.75 @ 23.50  
\$20.00 @ 20.50  
\$18.00 @ 19.00

## Foreign Markets.

### EQUIVALENTS.

	Cents.	Tons.
France, Peseta or Lira.	19.3	20
Florin (Netherlands).	20.5	20
Fiorin (Austria).	25.9	1,350
Witreis (Portugal).	1.08	40,000
Milreis (Brazil).	54.6	340,000
Mark (Germany).	23.8	450,000
Pound.	220.5	336,000
Kilogram.	220.5	1,097,738
Picul.	134	1,375,017

**GREAT BRITAIN.**—The business done in Iron, Steel and Machinery during the week has been on a more extensive scale than was witnessed since the mid-week meeting. It is true that increasing freights have tended to make shippers hang fire a bit in placing orders, and the home trade may be slightly checked by the near approach of the holiday season, but on the whole business is in a fairly satisfactory state. A more hopeful and confident tone is reported from Scotland, and of course Middlesbrough shares in this feeling. We do not put much confidence in the report of a big error in the Scotch Pig Iron market. The clique who have been instrumental in getting a top-weighted operation to manipulate the Scotch market. All the visible state of matters is against a "bull" movement in Pig Iron. There are at present 55 tons in blast in Scotland, against 67 last year, and about 1,000,000 tons of Iron in public stores. We do not, however, disregard the fact that statistics do not count for much when prices are so high as they are at present and a strong indication might achieve the expected and unexpected. As a little excitement would be reasonable, we would like to see a move in the direction of a "bull" movement on the Glasgow Iron market. The Steel trade is rather flat, but we anticipate a livelier time after the turn of the year, when numerous orders for ship's materials should be placed. The Steel Rail trade is quiet, but there are several bulky orders to place which should stimulate business.—*Iron and Steel Trades Review*, December 2.

**SCOTCH PIG IRON.**—The market is characterized by a more buoyant tone than has been experienced for a long time back; indeed, there has been a very marked degree of activity as regards the warrant department, where speculative purchases have been made in sympathy with the advances reported in the prices of Copper and Tin. A number of outside investors, who have been making a "pot" of money by their speculations in those metals, are now turning their attention to the Glasgow Iron market and on their account the market is considered to be in a more active state than before. The week before last an advance of 8d per ton was recorded in the price of Scotch Warrant Iron, but last week a further advance of 11½d per ton was registered, being the greatest range recorded during a considerable period. Not only have there been large speculative purchases, but consumers generally have shown more disposition to buy for weight, as well as for quality. The market is weak at present and a strong indication might achieve the expected and unexpected. As a little excitement would be reasonable, we would like to see a move in the direction of a "bull" movement on the Glasgow Iron market. The Steel trade is rather flat, but we anticipate a livelier time after the turn of the year, when numerous orders for ship's materials should be placed. The Steel Rail trade is quiet, but there are several bulky orders to place which should stimulate business.—*Iron and Steel Trades Review*, December 2.

**COLOMBO, Ceylon, October 21, 1887.**—*Plumbago* has weakened during the week, and present quotations, in rupees, per ton, are: 150 for Large Lumps; 110 @ 145 for Ordinary Lumps; 80 @ 90 for Chips; and 45 @ 60 for Dust. They were shipped during the month of November, totalling 300 cwt. to the United States. Loading, 4th inst.; 99,800 and 1400 tons respectively. Coal—Has weakened; Newcastle, spot, is bringing 30/6; Orrell, 28/9, and Australian, 25/10. October 21st. New York West Hartley shipment, 25/10. Exchange, 90 days, 21/4%. Weber & Co.

**EAST INDIES.**—*SINGAPORE, October 21, 1887.*—*Tin.*—Since our last report on October 3rd Tin has been in active demand, but latter dealers have refused to sell,

## Paints, Oils, &amp;c.

## Paints.

Black, Lamp—Coach Painters	22 @ 24¢
" Ordinary	6¢
Black, Ivory Drop, fair	12 @ 15¢
" best	25¢
Black Paint, in oil, kegs, 82 lbs; assorted cans, 11¢	40 @ 53¢
Blue, Prussian, fair to best, in oil	45 @ 60¢
" Chinese dry	7¢
" Ultramarine	18 @ 30¢
Brown, Spanish	13¢
Van Dyke	10 @ 12¢
Dryers, Patent American, ass'd cans, 9¢; kegs, 7¢	234,832 Casks
Green, Chrome	15 @ 23¢
Green, Chrome in oil	14 @ 18 @ 25¢
Green, Paris	g. od., 20¢; best, 25¢
Green, Paris in oil	good, 30¢; best, 33¢
Iron, "art." Red	20 @ 21¢
Iron Paint, Brown	20 @ 24¢
Iron Paint, Purple	20 @ 26¢
Iron Paint, Ground in oil, Bright Red	20 @ 14¢
Iron Paint, Ground in oil, Red	20 @ 14¢
Iron Paint, Ground in oil, Brown	20 @ 14¢
Iron Paint, Ground, Purple	20 @ 14¢
Litharge	6¢
Mineral Paints	2 @ 4¢
Orange Mineral	10¢
Red Lead, Americana	6¢
Red Venetian (Eng.) dry	\$1.65 @ \$1.70
Red Venetian in oil, as t'd cans	11¢; kegs, 8¢
Red Indian Dry	9 @ 12 @ 15¢
Rose Pink	10 @ 13¢
Sienna, American Raw, powdered	4¢
Sienna, Burnt, powdered	41¢
Sienna, Burnt, in oil	10 @ 10 @ 20¢
Sienna, Raw	11 @ 15 @ 25¢
Umber, Burnt, powdered	4 @ 8¢
Upper, Burnt, oil	9 @ 10 @ 12¢
Umber, Raw, powdered	4 @ 7¢
Umber, Raw, in oil	9 @ 12 @ 15¢
Vermillion, Chinese	90¢
Vermillion, English	55 @ 60¢
Vermillion, American Common	15¢
White Lead, American pure dry	24¢
White Lead, American pure dry, in oil	7 @ 7¢
White Paris, English Prime	2 @ 2¢
Yellow Ocher, French	\$1.75
Yellow Ocher, French, in oil	ass'd cans, 11¢; kegs, 8¢
Yellow Ocher, Vermont	in casks, 11¢
Yellow Chrome, in oil	17 @ 20¢
Zinc White, American No. 1, dry	5 @ 6¢
Zinc White, American No. 1, in oil	9¢
Zinc White, French (Paris Dry)	51¢ @ 74¢
Zinc White, French, in oil	10 @ 11¢

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TRUE DRILLING.

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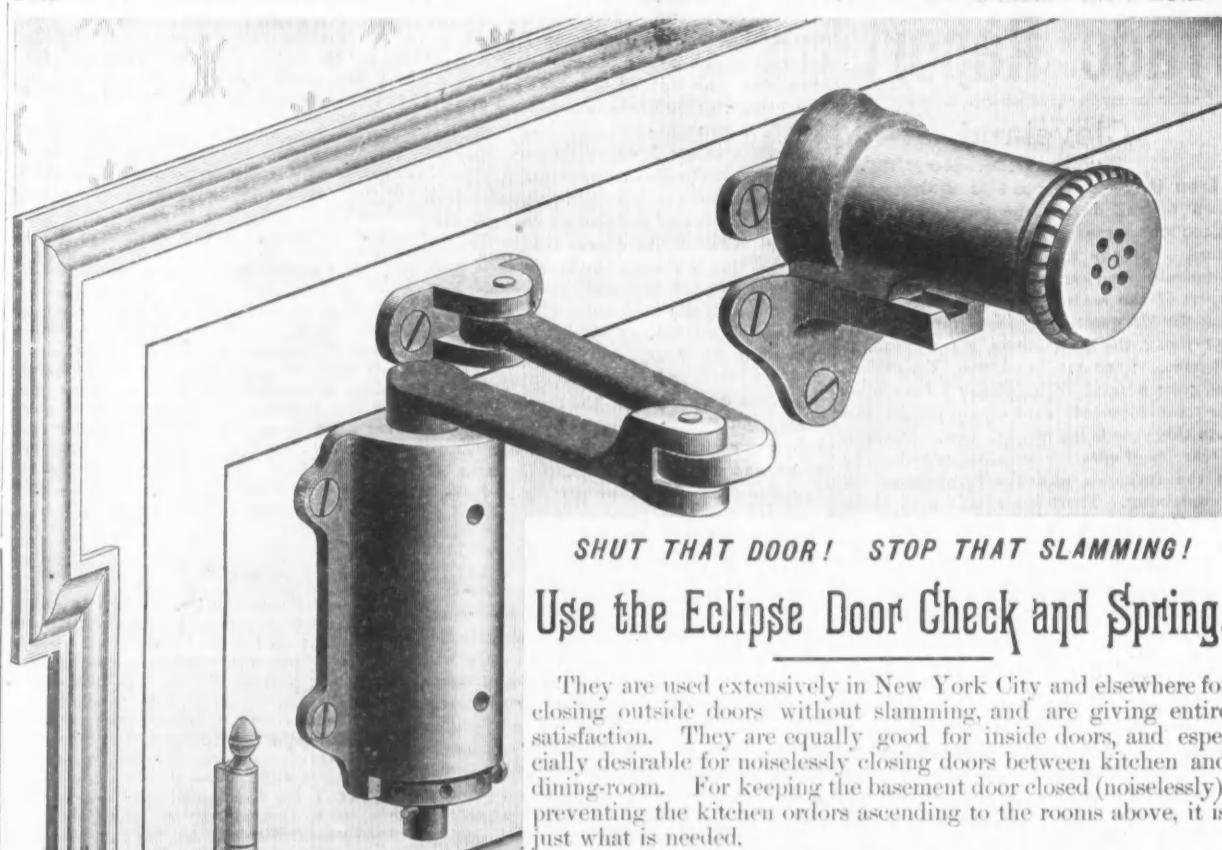
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They are used extensively in New York City and elsewhere for closing outside doors without slamming, and are giving entire satisfaction. They are equally good for inside doors, and especially desirable for noiselessly closing doors between kitchen and dining-room. For keeping the basement door closed (noiselessly), preventing the kitchen odors ascending to the rooms above, it is just what is needed.

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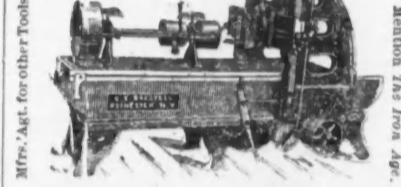
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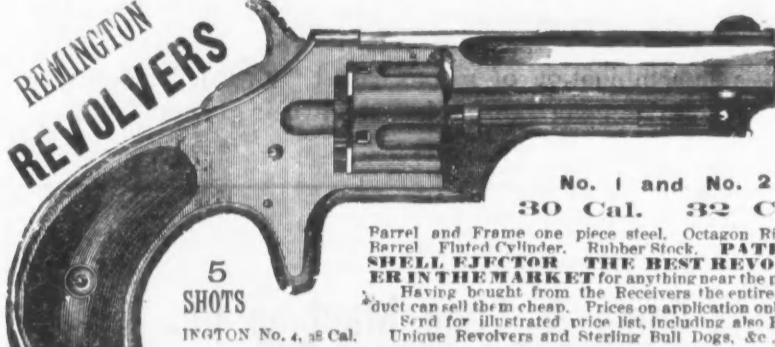
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#### MANUFACTURING.

##### IRON and Steel.

In answer to a report that the Bellaire Nail Works, of Bellaire, Ohio, had decided to return to the use of coal as fuel, instead of natural gas, on account of the diminished supply of the latter fuel, we received the following from the company, under date of the 6th inst.: "The 15 steam boilers in our steel works are now using coal, but all the balance of our works is still running on natural gas, and we hope to be able to do so right along. The trouble with the natural gas supply is that the main-pipe is not large enough. With an adequate main from the wells we believe there would be no trouble with the gas supply."

The Duquesne Tube Works Company is a new manufacturing interest established on the other side of the Monongahela, near the Duquesne Steel Works, Pittsburgh. The factory is a small one devoted to the specialty of turning out boiler tube flues and will start turning out pipe next week. The company has one furnace in operation. The manager is W. L. Hurd, formerly manager of the Continental Tube Works, at Soho. The company is composed principally of McKeesport people, with H. C. Bredeen, president; H. C. Stuckslager, treasurer, and Samuel Briggs, secretary. The material is now on hand and 75 men will be started on the works next week.

The rolling mill which has been in contemplation at Peoria, Ill., is still being talked about, the projectors having sufficient faith in the advantages of the locality to make them hope that eventually they may be able to interest capitalists in the undertaking, although not much encouragement has been secured thus far.

The Union Steel Company, of Chicago, shut down their steel works and rail mills on the 5th inst., having completed all the rail contracts on their books. The month of December will be devoted to general repairs, so that a good start can be made in January, by which time it is hoped that the railroad companies will be in the field with their orders for next year's delivery.

The Amalgamated Association has formally declared a strike at the Solar Iron Works of Wm. Clark's Son & Co., at Pittsburgh. The question in dispute was the two job system. The firm wished a roller named Sims to hold the position of roller of the 7 and 9-inch mills, and declared a shut-down if he should not be allowed to do so. They claimed that they could not procure any other roller competent to hold either position to their satisfaction. Five hundred men were thrown out of employment.

A boiler in the Hubbard Iron Company's rolling mill, at Hubbard, Ohio, exploded last week. The boiler was an old one. The explosion wrecked and damaged the mill considerably, and a fortnight will be occupied in making repairs.

Graff, Bennett & Co., iron manufacturers, at Pittsburgh, have nearly completed their work at the Thirty-second street mill in that city, only 15 men being at work, finishing up on small jbs. On the 1st of January they will move all their employees to the new mill at Millvale, which will begin operations with the new year. The entire plant will be taken possession of by the Carbon Iron Ore Company, of New York, who purchased it a year ago.

The bridge manufacturers of Pittsburgh are enjoying a season of unusual prosperity, and are compelled to run their works to their utmost capacity in order to get out work as fast as it is needed. The Keystone works are now running double turn. They have recently built a mile of elevated railway in New York City, and are at present building a bridge 1550 feet in length, to span the Missouri river at Kansas City. They are also building five bridges for the Kansas and Oregon Railroad Company. The Pittsburgh Bridge Works have contracts on their books aggregating \$200,000, for Western railroad works.

The Hampden Foundry and Machine Company, of Clifton, W. Va., have been chartered with a capital stock of \$10,000 to manufacture stoves, machine work, &c. The following are the incorporators: R. J. Redman, John A. Redman, B. R. Stevenson and H. J. Morton, of Clifton, W. Va., and E. S. Grant, of Middleport, Ohio.

The Phoenix Furnace, of Brown, Bonnell & Co., Youngstown, Ohio, is being relined and a number of improvements added.

We take the following items from the Ironton (Ohio) Register of the 8th inst. concerning the manufacturing establishments at that place: "Belfont is turning out 50 tons a day, mostly No. 1. It is using 80 per cent. native and 20 per cent. Missouri ore. Mt. Vernon Furnace got a supply of water last week, and turned on the blast. The Belfont Nail Mill is running full. The forge department goes on to day or to-morrow, and runs for an indefinite time. Belfont made some steels nails last week that were fine. The experiment of rolling steel slabs was a success. Iron and Steel Furnace is running as usual. Their fuel is now three-fourths coke and one-fourth coal. Three of the new boilers of the Lawrence mill will make steam to-morrow, and then the mill will be put on full. A new building has been erected for the battery of boilers."

Elle Furnace, operated by the Wheeler Furnace Company, at Sharon, Pa., will be blown out about the first of the year for the purpose of making some needed repairs.

The large lap-weld furnace at the pipe mill of the Reading Iron Works, Reading, Pa., was shut down recently, throwing about 50 men out of employment.

The Howard Rolling Mill Company, Limited, have erected and recently put in operation at Howard, Center County, Pa., a mill for the manufacture of iron and steel wire rods. They operate a charcoal forge in connection with the mill, in which they manufacture blooms for iron rods, but they purchase billets for steel rods. Very satisfactory results have been obtained from domestic billets, but in order to control their raw

material as far as possible the company are erecting a Bessemer converter, which they expect to have in operation early in the coming year. They will cast small ingots, and expect to make enough to supply their rod mill, which has a present capacity of 40 tons a day, double turn. The rods rolled have from the start been very perfect, free from fins. Operations thus far have demonstrated to the satisfaction of the owners of the works, who are Western parties, that they can make steel wire rods at a price enabling them to compete with foreign rods at current rates.

J. H. Leeds, secretary of the Glasgow Iron Company, Pottstown, Pa., calls attention to the fact that our announcement that the "works" of the company have gone on single turn may lead to some misapprehension. It is only their steel plant which is not running full. Their plate and bar mills are producing to their fullest capacity.

We have a letter from Mr. J. P. Withrow, of Pittsburgh, denying the statement which appeared in our issue of the 1st inst. in regard to an alleged collapse of brickwork at the new furnace at Saxon of Messrs Robert Hare-Powell's Sons & Co., Mr. Withrow writes: "We made a contract with the firm to build a furnace and three Whitwell stoves. The work was finished according to agreement with perfect satisfaction to the firm. The furnace has not been put in blast, and the brickwork stands to-day as complete a piece of work as was ever put up in a furnace in this country. There is no dispute between us and the firm, the only reason why the furnace has not been put into blast until now being that the assignee of the firm is under the necessity of having an appraisal made. An extension has been granted the firm, and No. 2 Furnace will be put into blast before January 1. The filing of a mechanics' lien against the firm by us was done with the full consent of the latter."

The Sunbury Nail, Bar and Gutter Iron Mfg. Company, Sunbury, Pa., were compelled to shut down their mills to day for want of soft coal. On account of the strike in the anthracite regions bituminous coal is greatly in demand.

One of a battery of eight boilers in the rolling mill of the Hubbard Iron Company, at Hubbard, Ohio, blew up on the 5th inst. The boiler was an old one, having been in use a long time. The other boilers were all thrown out of position, the stacks blown down, and the boiler house is a mass of ruins. The accident will keep the mill idle one week.

The Bethlehem Iron Company, of Bethlehem, Pa., have been experimenting for the past few months with what is known as the Archer gas-fuel process, by which petroleum is employed as the fuel. These experiments have been made in two of the company's ingot reheating furnaces, and the results accomplished have been such as to lead the company to contract for two additional plants, which are now in course of erection.

Belmont Furnace, of the Belmont Nail Company, at Wheeling, W. Va., was blown out last week, for the purpose of being relined and repaired.

About 12 years ago the Mount Hope Iron Works Company, of Somersett, Mass., sold part of their plant to the Old Colony Iron Works, of East Taunton, for \$117,000. Recently the Mount Hope Company bought back this property for \$35,000. Immediately workmen were engaged to repair it thoroughly. It is now said that the company intend to move their nail works into the building recently purchased and equip the old building for a lead works to produce sheet lead, lead pipe, &c. The concern will probably be ready to commence operations in March or April.

The Glendon Iron Company, of Easton, Pa., have blown out their No. 4 furnace. This is the second furnace they have shut down within a week. The reason assigned is poor and high-priced coal and the good opportunity to repair the stack.

The 16-inch bar mill, at the American Iron Works of Jones & Laughlin, Limited, Pittsburgh, which has been shut down for some time, resumed operations on the morning of the 12th inst. About 100 additional men were given employment.

The Standard Iron Company, of Bridgeport, Ohio, have made arrangements with the Wheeling Natural Gas Company by which sufficient gas will be furnished them for the running of the entire mill, thus avoiding the necessity of using coal.

Owing to a lack of orders the Clapp-Griffith department of the Spang Steel and Iron Company's works, at Etna near, Pittsburgh, has been shut down. It is not expected that operations will be resumed before the beginning of the new year.

It is expected that the Edgar Thomson Steel Works, at Braddock, Pa., will close the present year's contracts some time next week. The extensive works will then be closed down and important improvements and repairs will be made.

#### Machinery.

A dispatch from St. Louis dated December 9 says: "The machine shop belonging to the South St. Louis Foundry Company, of which Robert J. Kilpatrick is president, situated in South St. Louis, burned to-night. The loss is \$20,000."

The Baldwin Locomotive Works, at Philadelphia, have recently received an order from the Philadelphia and Reading Railroad for 35 engines, work on which has been commenced.

Messrs. E. E. Magovern and H. W. York, formerly with the New York Steam Company, have, for the present, established themselves as consulting engineers at 22 Cortlandt street, New York.

The Howard Rolling Mill Company, Limited, have erected and recently put in operation at Howard, Center County, Pa., a mill for the manufacture of iron and steel wire rods. They operate a charcoal forge in connection with the mill, in which they manufacture blooms for iron rods, but they purchase billets for steel rods. Very satisfactory results have been obtained from domestic billets, but in order to control their raw

material in the shop is a total loss and there were at the time 250 pairs of bob sleds in process of manufacture, besides other work. A letter to us from the company, dated the 9th inst., states that about half of the foundation had then been laid for rebuilding the works, and it was expected that they would be running again in about six weeks.

The Mason Regulator Company, of Boston, Mass., write us in a recent letter that their locomotive valve has been adopted by the following railroads: Pennsylvania, Boston and Albany, Old Colony, Lehigh Valley, Baltimore and Ohio, East Tennessee, Virginia and Georgia, Connecticut River, Burden, Cedar Rapids and Northern, &c.

Mr. George E. Brettell, of Rochester, N. Y., manufacturer of machinists' tools, writes us to the effect that he has entered into partnership with Mr. Wm. A. Wilson, and that the business will be continued under the firm name of Brettell & Wilson. Mr. Wilson has had charge of the works of the Woodbury Engine Company for the last 17 years.

The Curtis & Co. Mfg. Company, of St. Louis, report the following recent sales: No. 2 double giant saw mill and a gang edger for Tennessee; two 60 horse-power boilers, No. 5 Hooker steam pump, two saw trimmers and Prescott steam feed for Texas; two double giant saw mills for Texas; 60 horse power boiler for Texas.

The Billings & Spencer Company, of Hartford, Conn., gave an order last week for 100 gross tons of steel, to be used by them at their works in the manufacture of drop forgings for parts of locomotives, agricultural implements, guns, pistols, wrenches, sewing machines and machinery generally. Business is unusually good with this company, and every department is run to its full capacity.

A meeting of the stockholders of the Westinghouse Air Brake Company will be held at their office, in the city of Allegheny, on January 5, 1888, at 2 o'clock p.m., for the purpose of holding an election upon the question of an increase of the capital stock of such company and the disposition thereof in accordance with a plan to be submitted by the directors to said meeting.

A new catalogue and price list of tinsmiths' machines and tools and machinery for working sheet metal has just been issued by the Niagara Stamping and Tool Company, of Buffalo, N. Y. It embraces 130 pages, and

# POST'S "ZERO" METAL,

Registered in U. S.,

## FOR JOURNAL BEARINGS.

**Messrs. E. L. POST & CO.** beg to announce that by long and exhaustive tests and experiments with a machine designed and made expressly for this purpose, they have succeeded in producing, by an entirely new process, a combination of metals called "Zero," and, after comparative tests against the best brands of genuine Babbitt and so-called White Metals, they place it upon the market with their guarantee of its superiority confirmed by the official tests annexed:

THOMAS A. EDISON, President.  
SAMUEL INSULL, Secretary.

CHAS. BATCHELAR, Treas. and Gen'l Manager.  
JOHN KRUESI, Assistant General Manager.

### THE EDISON MACHINE WORKS,

CABLE ADDRESS:  
"Kydsun, New York."

86 to 108 Goerck Street.

NEW YORK, Oct. 25th, 1886.

MESSRS. E. L. POST & CO., No. 10 Peck Slip, N. Y.  
Gentlemen:—At a test made under our supervision with a machine designed for testing the friction of different metals, the accuracy of which cannot be doubted, we beg to inform you that the average friction of metals tested was 120 per cent. more than the Post's Zero Metal.

Very respectfully yours, etc., W. M. McDougall, Supt.

### MORGAN IRON WORKS,

JOHN ROACH & SON, Proprietors, Foot Ninth Street, East River.

NEW YORK, Nov. 17th, 1886.

Messrs. E. L. Post & Co., No. 10 Peck Slip, N. Y.  
Gentlemen:—Having been interested in the progress of the comparative test of Babbitt and Non-Friction Metals lately made at the Edison Machine Works, would say that they were accurate and results obtained correct. Although our own best Babbitt and Baker's White Brass submitted by us for test were badly beaten, the information gained reverts to our advantage in that all the time during the metal was in contact with the machine, which opened the way to invent the "Post's Zero Metal," which we do know to be A No. 1. Very respectfully yours, HENRY LEVYAT, Supt.

Result of Comparative Tests POST'S ZERO METAL, with other Babbitt and Non-Friction Metals under Supervision of Edison Machine Works, Goerck Street, New York, Oct. 25, 1886:

	Carried Weight Per Square Inch	Revolution of Shaft Per Minute.	Temperature of Grease.	Average Temperature.	Percentage of Friction Over Post's Zero Metal.	Remarks.
<i>Post's Zero Metal</i> - .	90 lbs.	740	50	109	—	
Edison Machine Works						
Best Babbitt . . .	90 "	740	50	147	64	The result of these tests show an average of
Hart Metal . . .	90 "	740	72	139	81	120%
Taylor's Arctic Metal . .	90 "	740	66	160	118	more friction than Post's
Thos. Wildes Genuine Babbitt . . .	90 "	740	66	141	74	Zero Metal.
J. Roach & Son Best Babbitt . . .	60 "	740	66	205	223	
Baker's White Brass . .	60 "	740	66	141	74	
Illinois Smelting Co. .	45 "	740	59	163	108	
Diamond Metal . . .	45 "	740	59	217	216	

C. WEBSTER, President.  
S. M. BURHAM, Secretary.

W. T. ALLEN, Treasurer.  
J. W. CHAMBERLAIN, Supt.

### OFFICE OF

## Webster, Camp & Lane Machine Co.,

NORTH MAIN STREET,

Near Academy of Music.

AKRON, OHIO, Jan. 12, 1887.

Messrs. E. L. Post & Co.,

NEW YORK.

Gentlemen:—With pleasure we submit the following comparative tests made by us this day of anti-friction metals. The high record in your favor stamps "Zero Metal" as the most profitable for manufacturers and consumers.

J. W. CHAMBERLAIN, Supt.

	Carried Weight Per Square Inch.	Revolution of Shaft Per Minute.	Temperature of Grease.	Average Temperature.	Percentage of Friction Over Post's Zero Metal.	Remarks.
<i>Post's Zero Metal</i> . .	123 lbs.	1050	70	117	—	The result of these tests show an average of
Hoyt's Genuine Babbitt . .	123 "	1050	70	130	28	79%
<i>Post's Zero Metal</i> . .	90 "	1050	70	109	—	more friction than Post's
Paul Reeves Special . .	90 "	1050	70	130	54	Zero Metal.
Hoyt's "Extra" . . .	90 "	1050	70	182	187	
Phosphor Babbitt . .	90 "	1050	70	122	30	
Hoyt's No "4" . . .	90 "	1050	70	150	105	
Bostwick's Polar Metal . .	90 "	1050	70	121	31	
Composition Brass . .	45 "	1050	70	116	118	

## "ZERO METAL FOR BABBITTING."

### A FEW FACTS WORTH KNOWING!

This Metal has been thoroughly tested under the following conditions:

- On High Speed Motor Engines.
- On the Fastest Running Wood-working Machinery.
- On Highest Speed Cold Swing Saws.
- On Merchant and Bar Iron Mills.
- On the largest Boiler Plate and Sheet Mills.
- Under 35-Ton Fly Wheel Shafts.

CORRESPONDENCE SOLICITED FROM DEALERS IN MANUFACTURERS' SUPPLIES.

**PUT UP IN 5 lb. BARS—100 lb. BOXES; PRICE, 25 CENTS PER lb.**

Represented in Eastern Pennsylvania by F. R. PHILLIPS, No. 407 Walnut St., Philadelphia, Pa.

**E. L. POST & CO., Sole Manufacturers, 10 Peck Slip, New York.**

N. B.—We prefer that Zero Metal should be bought through our Regular Dealers, but in places where "Zero" is not kept in stock by the trade, orders sent direct to us will receive prompt attention.

### SEND ORDERS DIRECT TO DEALERS:

GEO. R. LOMBARD & Co., Augusta, Ga.  
RUSSELL, BOYNTON & Co., Minneapolis, Minn.  
LOUIS SCHWARTZ, New Orleans, La.  
BRAINARD & SHEPARD, Albany, N. Y.  
GRANT & DUNN, Syracuse, N. Y.  
LOUIS ERNST & SON, Rochester, N. Y.  
BUTLER & GARDNER, Pittsburgh, Pa.  
EDWARDS & WALKER, Portland, Me.  
C. E. JAMES & Co., Chattanooga, Tenn.  
A. W. ACHARD & SON, Saginaw, Mich.  
THE MACHINISTS' SUPPLY Co., Chicago, Ill.  
PARKIN & BOSWORTH, Cleveland, Ohio.

POST & Co., Cincinnati, Ohio.  
W. BINGHAM & Co., Cleveland, Ohio.  
SHAW, KENDALL & Co., Toledo, Ohio.  
J. LE ROY PINE Co., Troy, N. Y.  
J. S. & N. A. WILLIAMS, Utica, N. Y.  
LIDDELL & Co., Charlotte, N. C.  
MACDONALD & Co., Halifax, N. S.  
EMERY & MOORE, Rochester, N. H.  
RICHARD & HUBBELL, East Tawas, Mich.  
SMITH & COURTNEY, Richmond, Va.  
W. A. CASE & SON, Buffalo, N. Y.  
J. M. WARREN & Co., Troy, N. Y.

W. S. NOTT & Co., Minneapolis, Minn.  
MORLEY BROS., East Saginaw, Mich.  
WADHAMS OIL & GREASE Co., Milwaukee, Wis.  
WATERS & GARLAND, Louisville, Ky.  
SUMNER, PRATT & Co., Worcester, Mass.  
TRAFTON & ANTHONY, Fall River, Mass.  
J. H. WYLIE, Jr. & Co., Holyoke, Mass.  
J. B. FARUM, Woonsocket, R. I.  
E. C. WRIGHT & Co., Fitchburg, Mass.  
E. C. ATKINS & Co., Indianapolis, Ind.  
E. C. ATKINS & Co., Memphis, Tenn.  
BALDESTON & Co., Glasgow, Scotland.

THE J. P. DONALDSON Co., Detroit, Mich.  
FREDERICK TAYLOR & Co., Lowell, Mass.  
GEO. B. CARPENTER & Co., Chicago, Ill.  
E. A. TIBBITS & SON, Great Falls, N. H.  
BROWN BROS. & Co., PROVIDENCE, R. I.  
COVEL & OSBORN, Fall River, Mass.  
F. I. WEBSTER, Turner's Falls, Mass.  
JAMES CLEMENTS & Sons, Bay City, Mich.  
BARNUM BROS., Troy, N. Y.  
E. G. STUDLEY, Grand Rapids, Mich.  
JAMES H. WELLS, Tampa, Fla.  
E. V. WYSSBROD & Co., Findlay, Ohio.

## The Manufacture of Tin Plates.

BY W. STERCKEN.

(Continued from page 17, December 1.)

## TINNING.

The materials used in tinning are either tin or an alloy of tin and lead, or, more rarely, with solder, and for covering the material bath and filling the first and last kettle of the tinning hearth, grease is used. For bright plates only the purest tin can be used. In England, Australian tin and, according to the price, Cornish tin, is employed, the latter especially for the first coat, the final coat being a deposit of the purest Australian tin. Latterly Australian Banks and Billiton are so pure that in many tin-plate works it is no longer subjected to the preliminary refining. At some works the tin is refined without reference whatever to the source from which it is obtained, and the tin which has become impure during the course of working is either sold or treated again.

For covering the bath of tin grease is used. It decomposes at a temperature of  $300^{\circ}$  Celsius, while the melting point of tin is  $228^{\circ}$ . At this temperature, and at higher heats, the tallow formerly used exclusively strongly developed fumes, which formerly made the work of tinning hearth very unhealthy. With the palm oil now generally employed, which is imported in large quantities from the west coast of Africa, this feature is not so strongly developed. Lager grease is known as the best, because it contains less water and impurities. In manufacturing terne plates, the coating of which (three parts of lead and one part of tin) melts only at  $250^{\circ}$  Celsius, the fumes developed from the grease are so strong that it is replaced in many localities by chloride of zinc. The latter melts at a temperature of  $150^{\circ}$ , develops no fumes and sublimes only at a temperature of  $700^{\circ}$  Celsius. Another mixture largely used is zinc salmiac, prepared by dissolving 10 parts of zinc in strong hydrochloric acid, adding 11 to 16 parts of chloride of ammonia and evaporating. Such substitutes for grease are called fluxes. They act like a pickle in some respects, and their use is considered disadvantageous because particles of the fluxes adhere to plates, which easily causes rapid rusting of the finished plate.

## THE MODERN FIVE-POT TINNING HEARTH.

The accompanying engravings, Figs. 23 and 25, show a modern tinning hearth, such as is used widely, in a slight modification, in England and in other countries where tin plates are made. It consists of a block of masonry work, in which there are five kettles, *a*, *b*, *c*, *d* and *e*, differing in size. Each, with the exception of *a*, is provided with a simple grate, the flame of which impinges upon the pots. All of the flues unite in the main flue *g*, or in one or several cast-iron pipes, which go through the smoke pipe placed above the hearth to carry off the fumes of the grease. Every hearth has a grease pot, *a*, a coarse pot, *b*, and brushing pot, *c*, and, finally, a rolling pot, *e*. Between *b* and *c*, or *c* and *d*, the brushing platform *e* is arranged. The pots *a* and *e*, are filled with palm oil, *b*, *c* and *e*, are filled with tin. In the working pot *e*, are located several, generally five, rolls, *h*, Figs. 26, 27 and 28, rotating in such a way that the two upper left rolls carry the plate downward, and the others lift it out of the grease. The two sets of rolls rest upon two bearings, which are attached to the upper flange of the pot by screws, *i*, and are connected with one another by rods, *k*. The upper center and the left roll has its bearing on *t*, while the bearings of the other rolls can move between *m* and *l*, and can be pressed by screws, counter weights, or by the lever *o*, against the stationary bearings, the pressure being regulated by set screws. By pressing the rolls together more or less the thickness of the coating of tin is determined. One of the rolls, usually the center upper roll, is driven, and by means of gearing, *p*, the other rolls are made to revolve in the direction indicated by arrows. It is a very important thing to have all the gearing working together uniformly, because otherwise streaky plates are made. Modern English rolls have a somewhat different construction, as will be shown in the Taylor-Leyshon tinning hearth later on. The rolls consist of cast steel, and are well turned and ground. Hollow rolls have been tried in England, but have been found to be unsuitable. Before use, the rolls must be carefully tinned with the purest tin, and this must be kept up during the course of the work, which is done by pouring the tin upon the rolls from time to time. The clean surface is kept up by frequently pouring grease over them from the rolling pot. In spite of this it does occur that particles of tin ashes fasten on the rolls, which leaves behind on the plates a series of dots which may be noticed on every plate. The upper set of rolls lie with their point of contact a little below the surface of the grease. In the case of terne plates their location is a little above it. In all the drawings the level of the tin is indicated by a series of double-dotted lines, while the level of the grease is shown by a series of crosses. As already stated, two rolls force the plate into the grease, while the others take it out of it. This requires an arrangement to catch the plates when they leave the first set of rolls, and then to conduct them from below into the rolls intended to carry them out of the vat.

The construction of the devices for this purpose varies considerably. A contrivance of this kind used in Germany is shown in Fig. 29. On an offset of the pot two angles, *a*, are attached, upon which rests a rod, *b*, with two levers, *c*, and two rods, *d*; *c* and *d* carry the box *e*, made of round or flat iron. In the position drawn in full lines the plates which drop from the rolls *f* *g* are caught, and by moving the lever into the dotted position the plate is lifted in the rolls *g*.

While working satisfactorily this arrangement has a disadvantage that the box *e* must be changed to suit every change in the size of the plates. This involves loss of time in working. Figs. 30 and 31 show guide rods, *a*, so attached to one side of the pot that they are placed a little way from the

center line of the right-hand rolls. On the other side of the pot is located an arm, *b*, to which is attached the arm *c*. Along the side of the pot three levers, *i*, are arranged, which, when at rest, are so placed that their upper short arms stand a little higher than the upper bar *g*. Now, when a plate drops from the rolls upon the arms *i* it is lifted by moving the handle *k* to the left, and by the arms *i* is pressed against the guides *a* and is thus conducted into the rolls. Another device used largely in England is shown in Fig. 32. It consists of a stationary guide, *a*, the hanging rods *d*, the lower half of which is provided with a screw thread to attach the levers *e* and the reversing fingers *f*, and the counter-weighted hand lever *g*. When the lever *g* is depressed the fingers *f*, by means of the nuckles *n*, strike the bearings

kept as high as possible without allowing the grease to catch fire, fluctuating between  $300^{\circ}$  and  $400^{\circ}$ , and rising at times up to  $450^{\circ}$ . The brushing pot *c* is filled with somewhat purer tin, and the grease covering it is also purer. The temperature is somewhat lower than in the case of *b*. Then follows the *b* of tin and the grease layer, which is kept as pure as possible, the temperature being about  $250^{\circ}$ .

The rolling pot *e* must be kept filled with entirely clean liquid grease, and at a temperature which lies somewhat above the melting point of tin, say  $230^{\circ}$  to  $240^{\circ}$ . The plates which had been put into standing water for final pickling are taken out of it shortly before tinning, and are placed singly into the grease pot *a* until the latter is filled, which takes about 200 plates. The grease is hot enough to evaporate the water after

hand, and could work more uniformly. Now the tinnings can work either way. In fact, the brushing does not play so important a part as it used to, since the introduction of the rolling pot, but in making good tin plates it is indispensable.

The rolls conduct the plates under the grease and drop them into the cage. The latter is lifted by the third workman, so that the plate is taken by the lifting rolls, is grasped by the same workman by a pair of tongs, and is turned over to a boy or girl for cleaning off grease. According to the pressure of the spring levers, the rolls press off the superfluous tin from the plates. It gathers in the bottom, and is pumped out by a simple cast-iron suction or force pump. At some works a smaller pot is placed next to the rolling-pot, and is filled with grease.

The drawbacks on the tinning process described may be enumerated as follows:

1. That the necessity of an elaborate apparatus for five pots and four fireplaces, which require the greatest attention.

2. That the quality of the plates depends too much upon the skill and honesty of the tinning-men, in spite of the mechanical appliances employed. These come into play especially so far as the length of time which the plates remain in the tinning bath, furthermore, in the brushing, and, finally, in the handling of the plates, with the aid of tools.

3. That the manner in which the plates go through the tinning bath is the most unfavorable imaginable, because the plates coated with liquid tin come into contact with the air three times, the result being the formation of oxide of tin, which render the plates, and, in the long run, the tinning baths, too, impure.

4. That in this method of rolling, the different parts of the plates remain in the tin different lengths of time, according to whether they are nearer or more distant from the edge, which is first introduced into the tin. This, too, has its influence upon the purity of the coating of tin.

5. That the production of the five-pot tinning hearth is relatively smaller, being only about 30 boxes per 10-hour shift. In spite of these obvious drawbacks, efforts to devise a better method, or a better apparatus capable of furnishing plates as good, have not yet succeeded, although a good deal of pains and money have been spent in the trials. All the tinning hearths at works in England having less than five pots or using tinning machines make only lower grades of plates.

In discussing the question of simplifying the present methods it would appear, first of all, as though the brushing-pot might be disposed of, but if the system described is carefully considered it will be found that it is necessary for uninterrupted working of the hearth, because the first pot must be filled while the plates in the brushing-pot are being completed. When that process is completed the plates in the first pot are ready to go to the brushing-pot. In this manner continuous work is procured, each pot and each workman working in the hands of the one following. Since, furthermore, as many as 200 plates are in the first pot at the same time and almost as many stand in the brushing-pot, there are always 300 to 400 plates undergoing treatment. Now, as the plates are taken in hand in succession it follows that every plate remains in the tin from 30 to 40 minutes. It is impossible to keep within this limit when there are less than five pots, and in fact that has never been attained in any tinning machine, but the longer the plates remain in contact with the tin the purer will be the tinning, because all particles of steam or grease adhering to the surface of the iron and between particles of oxide of tin are loosened and carried upward. Their complete removal is effected only by the brushing.

It is an easy matter to prove that the brushing method, primitive as it may be, is absolutely necessary by comparing brushed and unbrushed plates. The latter, after passing through the pot, has a clearly grained surface, and carries the impression that there are innumerable minute grains under the coating of tin. Brushed plates, however, show this phenomenon to a much lesser degree—less so the more uniformly the work of brushing has been done.

It is the suppression of brushing that constitutes the drawback of all plates produced in hearths of modern design, or made in any tinning machine without exception, and which makes it impossible to produce good tin plates.

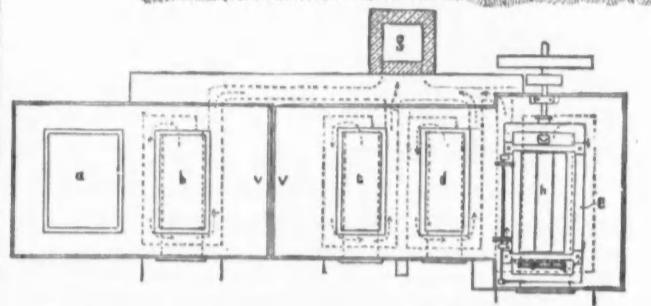
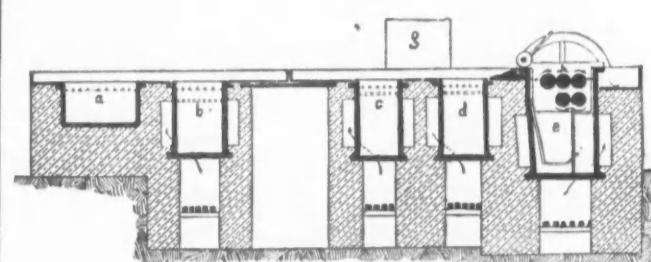
Efforts have vainly been made in such hearths and machines to supplant the brushing by stationary brushes of asbestos or hemp, or by rotary brushing rolls, or by scouring edges attached to springs.

(To be continued.)

The water bureau in Philadelphia last week awarded contracts for iron pipes as follows: To the Camden Iron Works, 500 lengths of 4-inch pipe, at 1.33 cents per pound; 10,000 lengths of 6-inch pipe, at 1.316 cents; 100 lengths of 8-inch pipe, at 1.312 cents; 100 lengths of 10-inch pipe, at 1.272 cents; 600 lengths of 12-inch pipe, at 1.261 cents; 250 lengths of 16-inch pipe, at 1.15 cents. To the McNeal Pipe and Foundry Company, 50 lengths of 16-inch pipe, at 1.230 cents per pound; 100 lengths of 20-inch pipe, at 1.228 cents; 100 lengths of 30-inch pipe, at 1.195 cents. To the Gloucester Iron Company, 600,000 pounds of small and large specials, at 2.35 cents per pound. To the Camden Iron Works, 500 pounds of breeches pipe, at 3.73¢.

The firm of Andrews Bros. & Co., owning and operating coal mines, rolling mills and blast furnaces, at Hasletton, near Youngstown, Ohio, have incorporated under the name of the Andrews Bros. Company, with a capital of \$500,000, all paid in. The change was put into effect on the 3d inst. The directors of the company are as follows: Wallace C. Andrews, of New York City, and Chauncey H. Andrews, L. E. Cochran, John A. Logan and James Neilson, of Youngstown. L. E. Cochran is president and treasurer, James Neilson vice-president and Henry W. Heady, secretary. The branch offices will be retained as before, with the Chicago office in charge of John McLaughlin, 53 Dearborn street.

The Orleans Railway Company have now ordered a small trial lot of chrome open-hearth steel locomotive tires for the purpose of ascertaining, from the results of actual practice, the merits of the compound for this purpose.



Figs. 23 and 24.—Vertical Section and Plan of Fire-Pot Tinning Hearth.

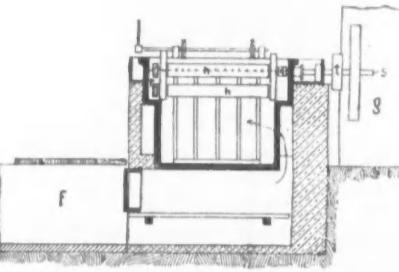


Fig. 25.—Cross Section of Tinning Hearth.

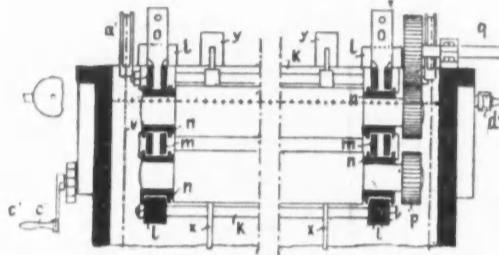


Fig. 26 and 27.—Section and Plan of Tinning Rolls.

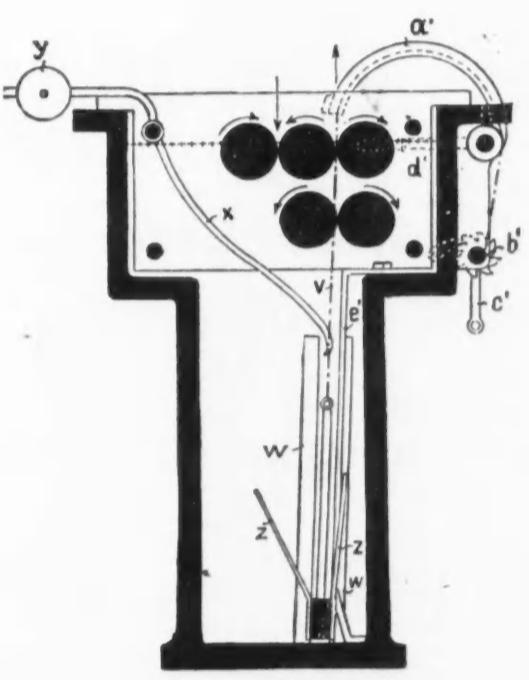
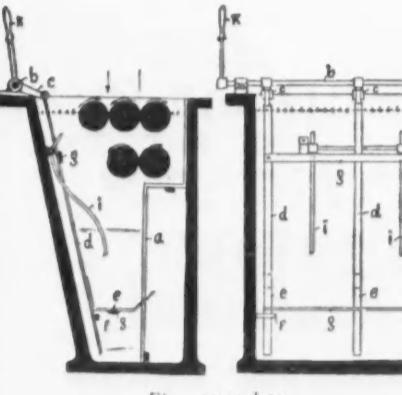


Fig. 28.



Figs. 30 and 31.

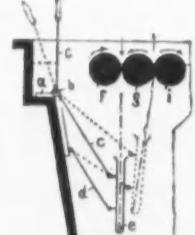


Fig. 30.

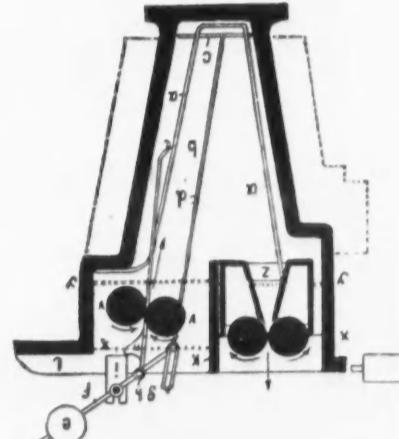


Fig. 31.—Device for Lifting Plates in Rolling Pot.

#### THE MANUFACTURE OF TIN PLATES. BY W. STERCKEN.

*i*, move to the left, throw over the plates and then the latter are lifted along the rods *a* by means of arms *c*. A third arrangement used in England is illustrated in Fig. 33. The lifting apparatus is entirely distinct from the contrivance for reversing the plate.

The latter consists of two simple levers, *x*, provided with counter-weights *y*. So far as the lifting arrangement is concerned, the box is provided with the two arms *z z*, slides along the guide *w* and is attached to chains *v*, which are carried over the arc arm *a'* to the little winch *b'* and is attached to it. The latter arrangement has the object of adjusting the position of the box without any difficulty to any size of plate.

The pot *a*, Figs. 23 to 25, is filled with palm grease already used. It is kept at a temperature of about  $100^{\circ}$  by the conduction of heat from the fire under the pot *b*, and by the very hot grease which flows over the pot *b*, when plates are put into it. If the grease were kept at  $100^{\circ}$  or more so much steam would be developed in putting in the wet plates that the grease would boil out of the pot. The pot *b* is filled with impure tin, which in order to avoid oxidation is covered with a layer of impure grease varying from 10 to 15 cm. The temperature in pot *b* is

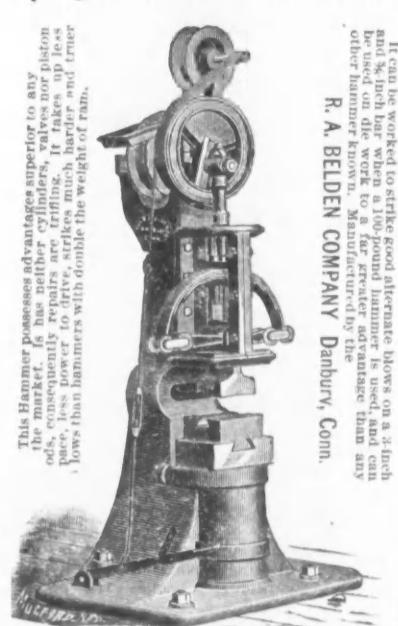
keeping the plates. After about 10 minutes the workman takes 20 to 30 plates out of the pot, passing them into kettle *b* vertically, where they remain about 10 minutes, to be transferred then to pot *c*. After an elapse of about 10 minutes, the brusher takes 20 plates from the kettle, and laying them on the plate *r* between this and the next pot brushes both sides of the plate with a brush soaked with grease. A third workman then seizes the plates, dips them into the pot *d* without letting them go, and lifting them out places them between the rolls.

In the tinning hearth shown in Figs. 23 to 25, the plate travels from left to right—that is to say, the workmen who dip the plate from one pot to the next are placed so that the grease pot *b* is to their left, and the rolling pot *e* is to their right. The reverse arrangement is also employed. As currently used, the arrangement of the brushing plate *r* is placed between the brushing pot *c* and the one following it, an arrangement which avoids any return movement of the plates. Formerly a great deal of importance was attached to the succession of the pots, and preference was given to the movement from the right to the left, because then the brusher had the brushes in his right

hand, and could work more uniformly. Now the tinnings can work either way. In fact, the brushing does not play so important a part as it used to, since the introduction of the rolling pot, but in making good tin plates it is indispensable.

The rolls conduct the plates under the grease and drop them into the cage. The latter is lifted by the third workman, so that the plate is taken by the lifting rolls, is grasped by the same workman by a pair of tongs, and is turned over to a boy or girl for cleaning off grease. According to the pressure of the spring levers, the rolls press off the superfluous tin from the plates. It gathers in the bottom, and is pumped out by a simple cast-iron suction or force pump. At some works a smaller pot is placed next to the rolling-pot, and is filled with grease.

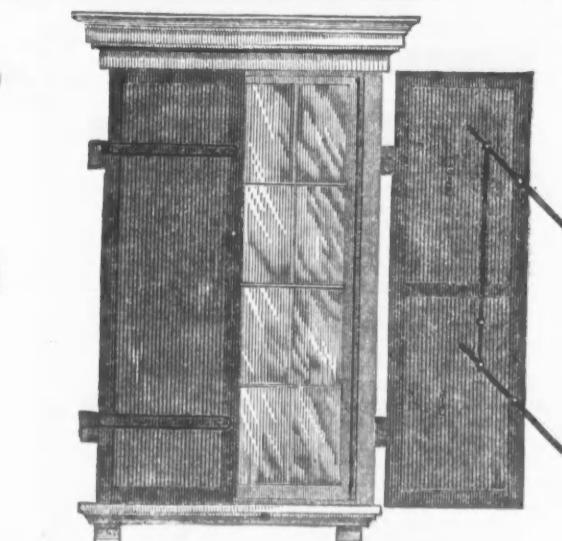
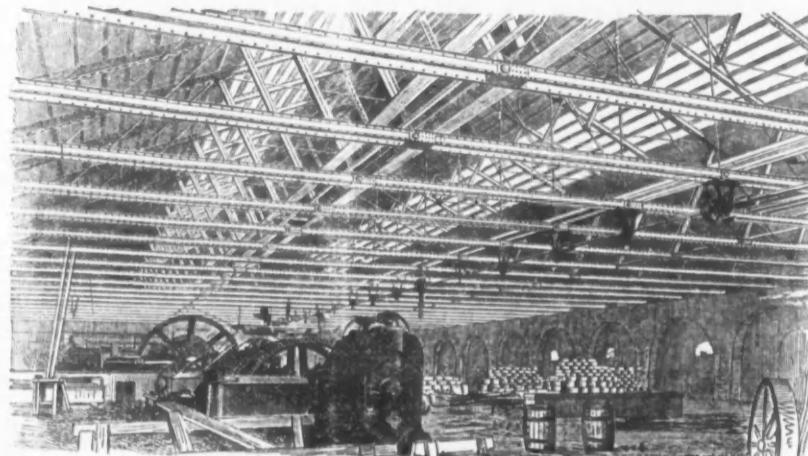
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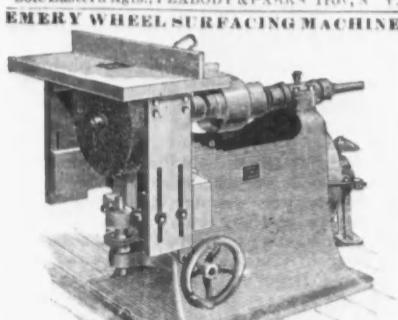
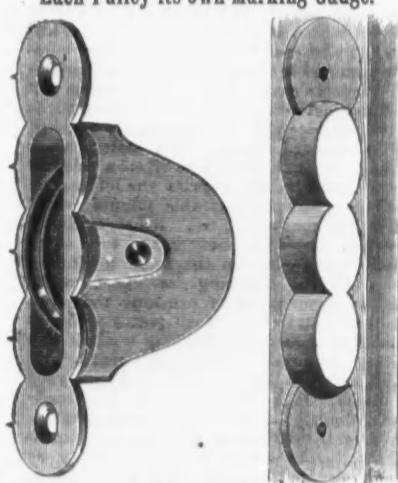
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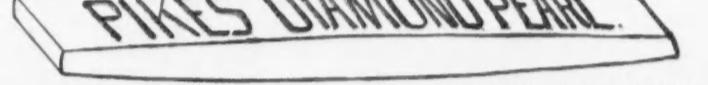
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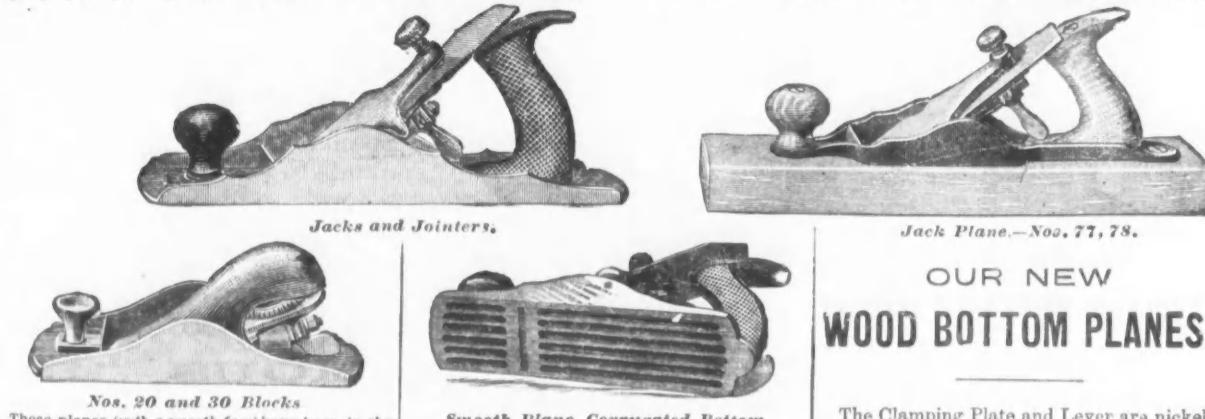
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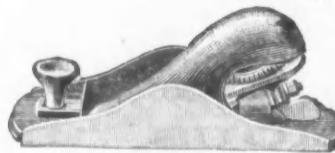


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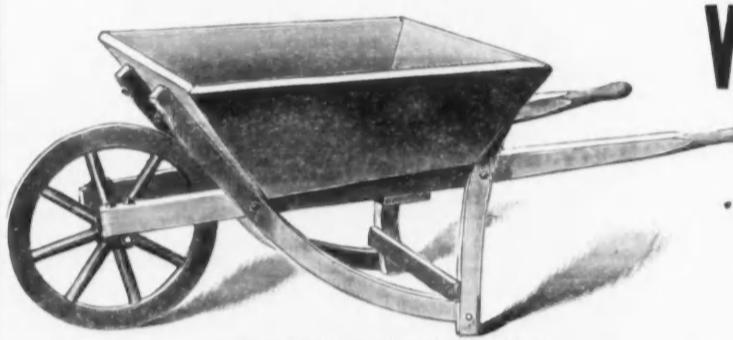
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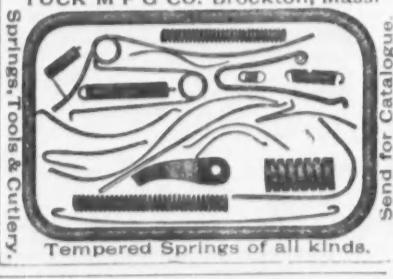
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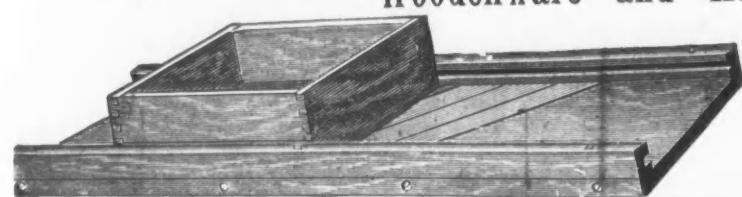
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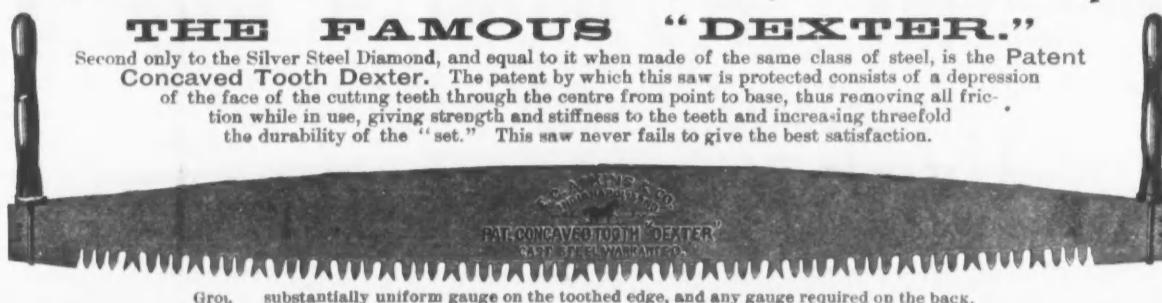
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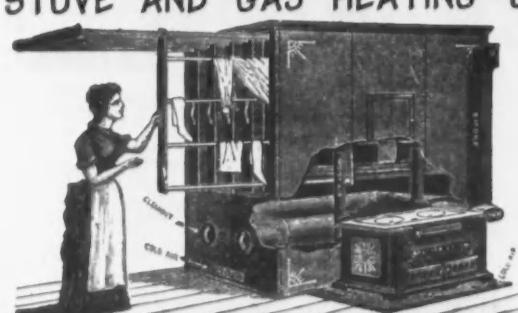
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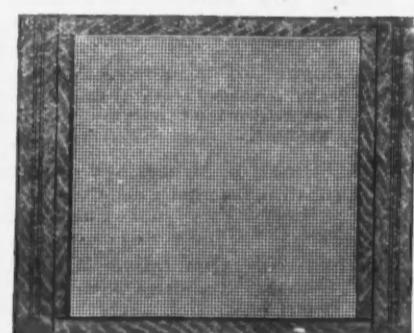
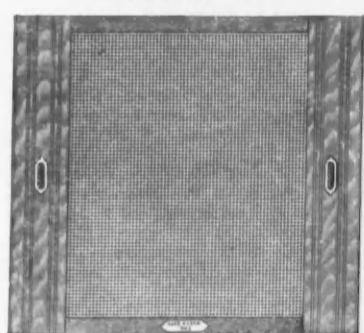
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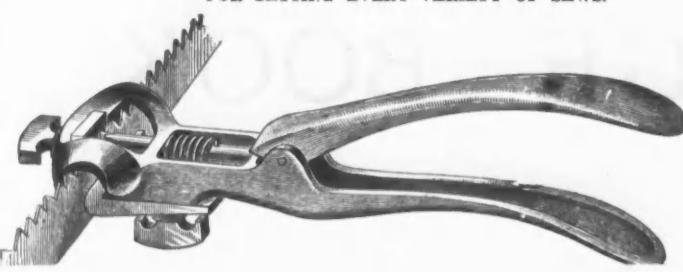
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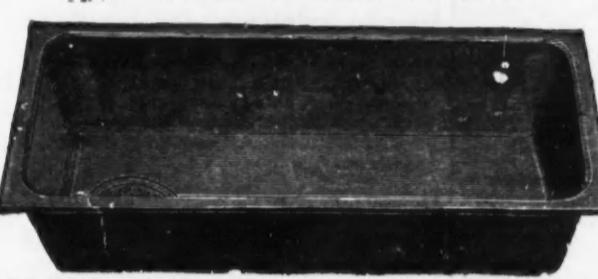
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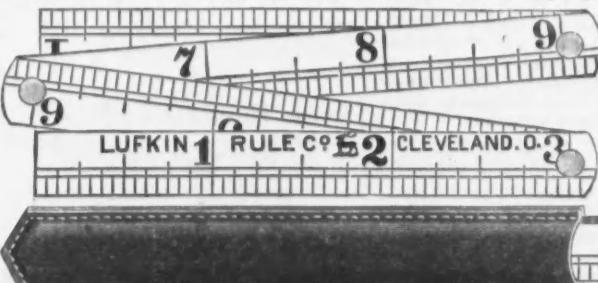
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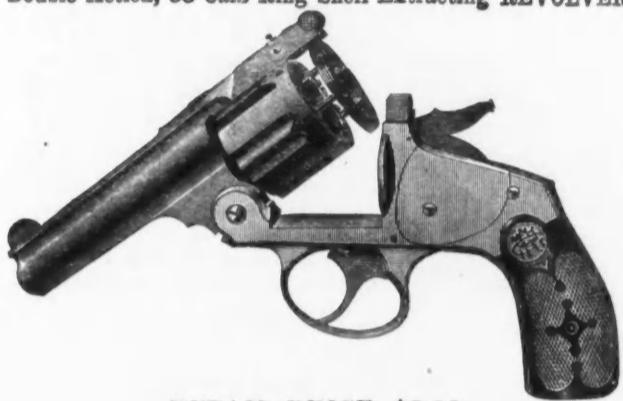
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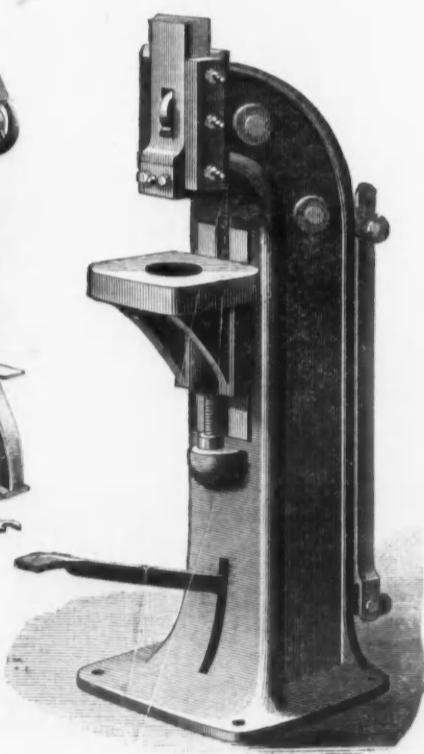
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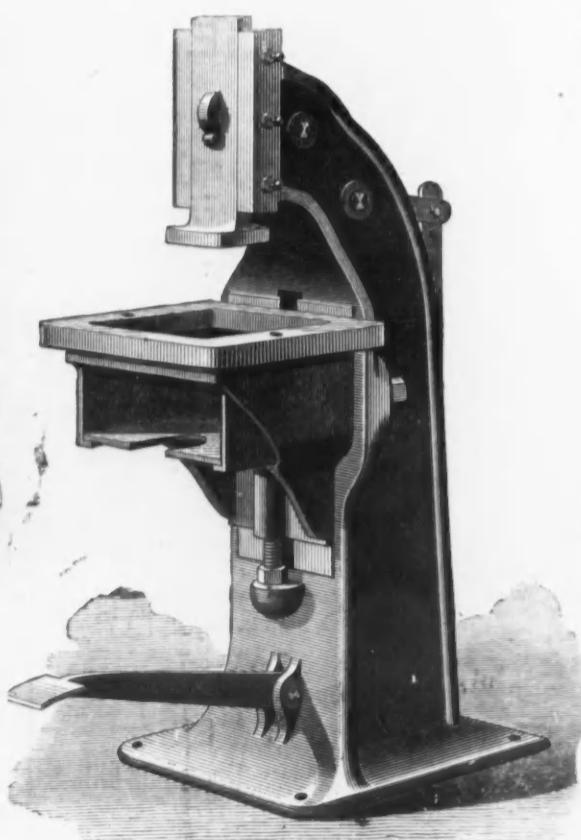
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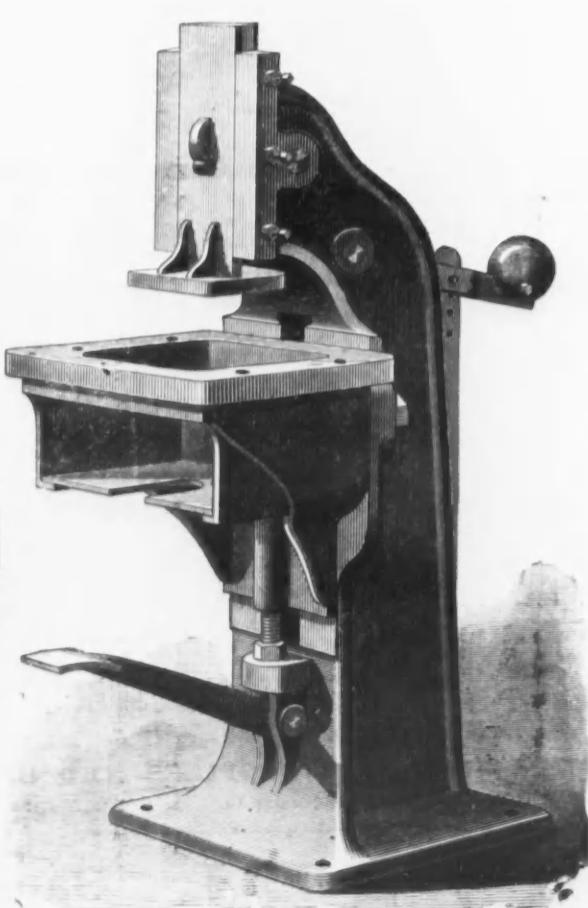
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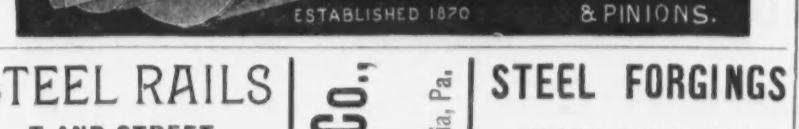
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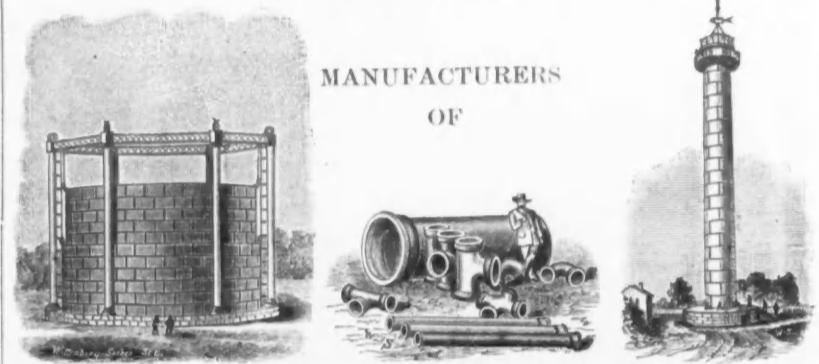
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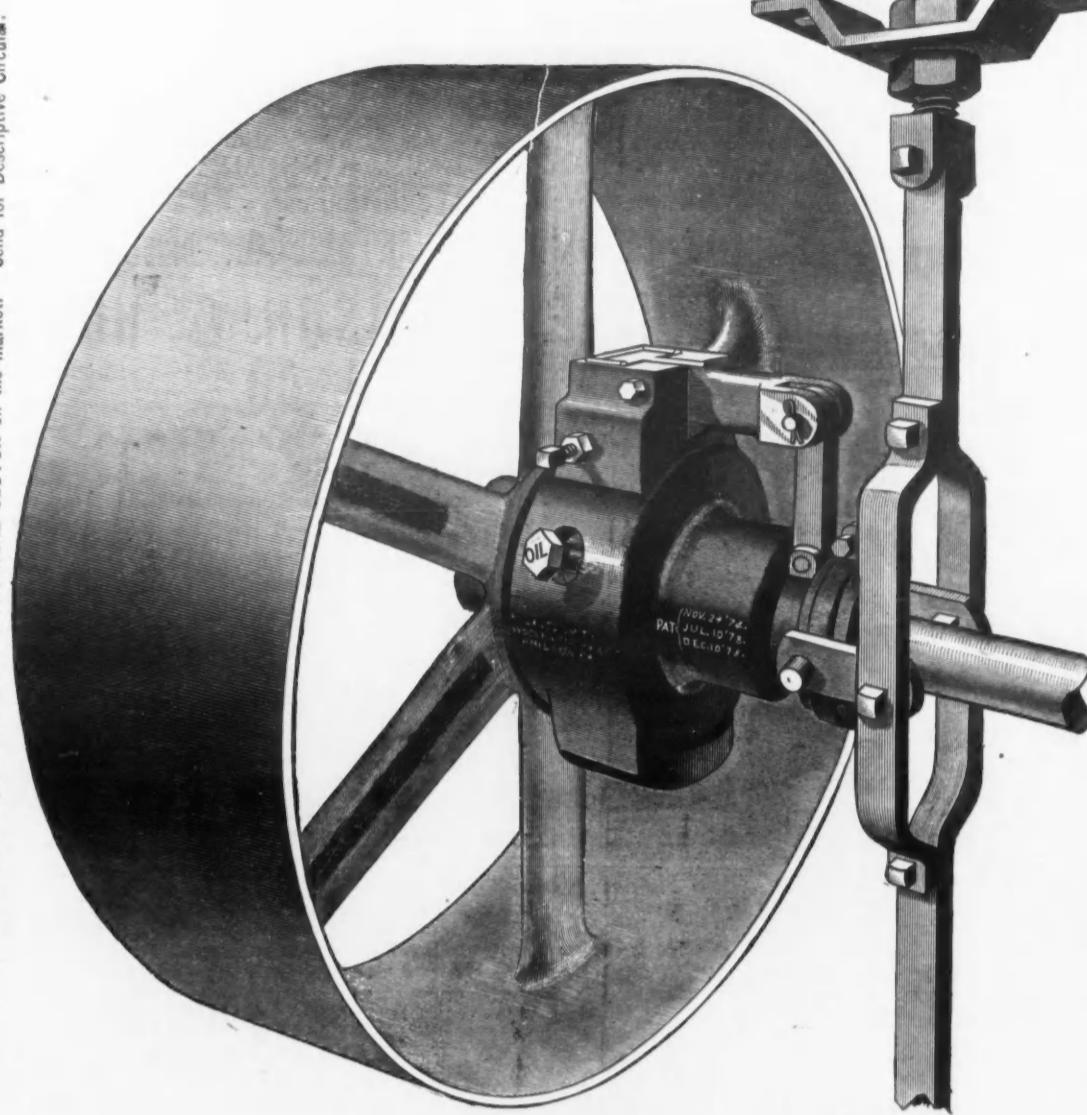
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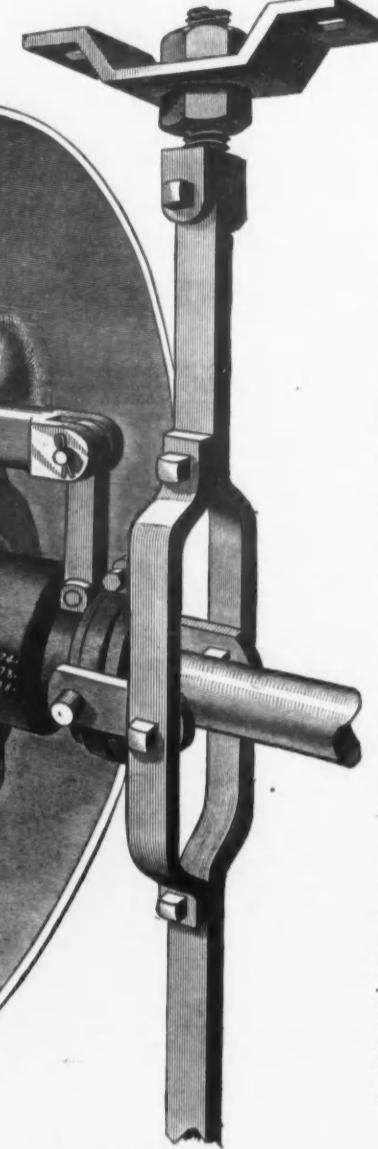
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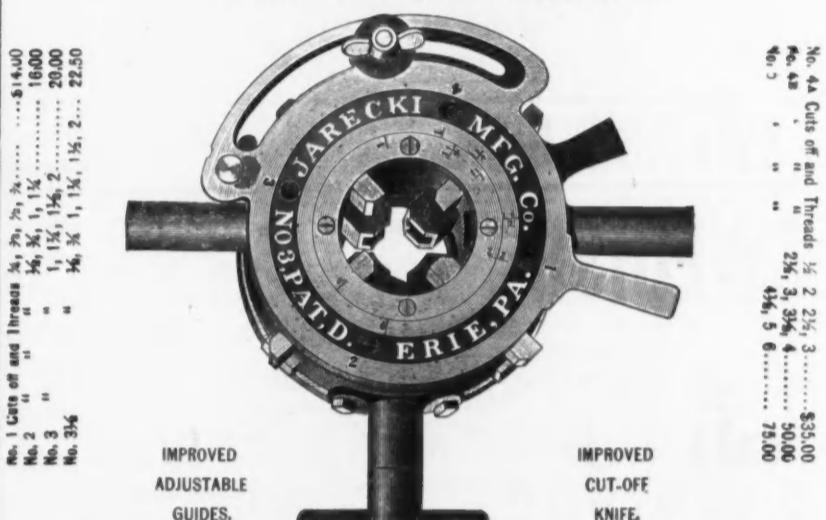
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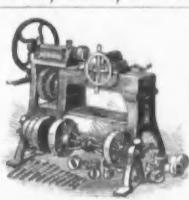
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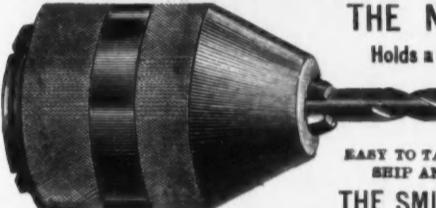
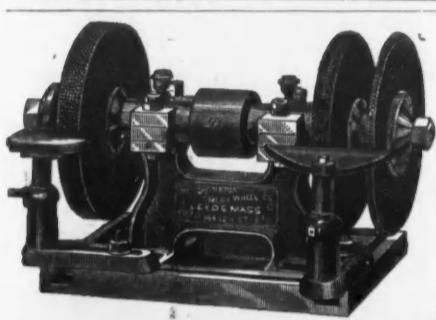
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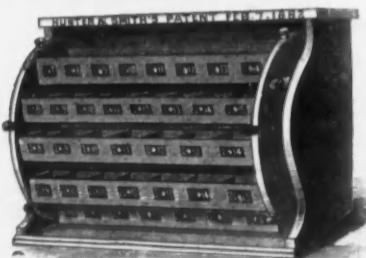
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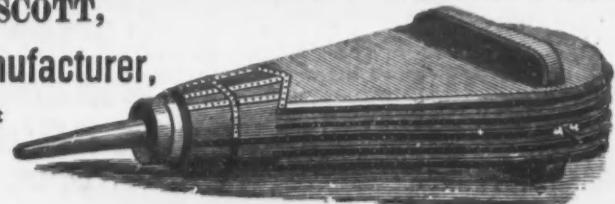
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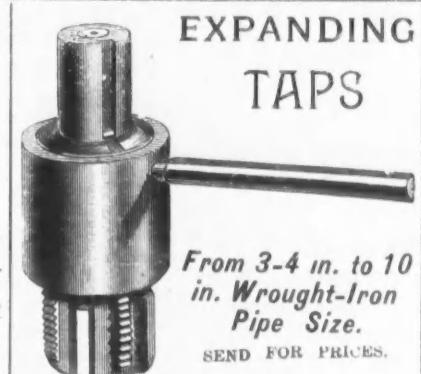
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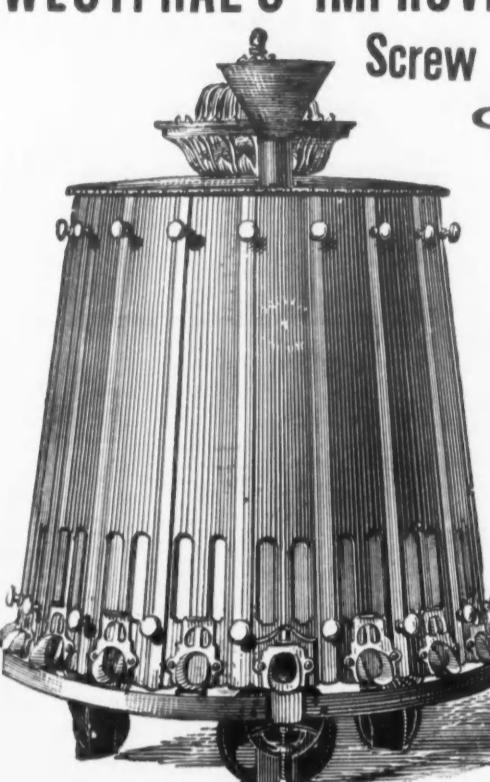
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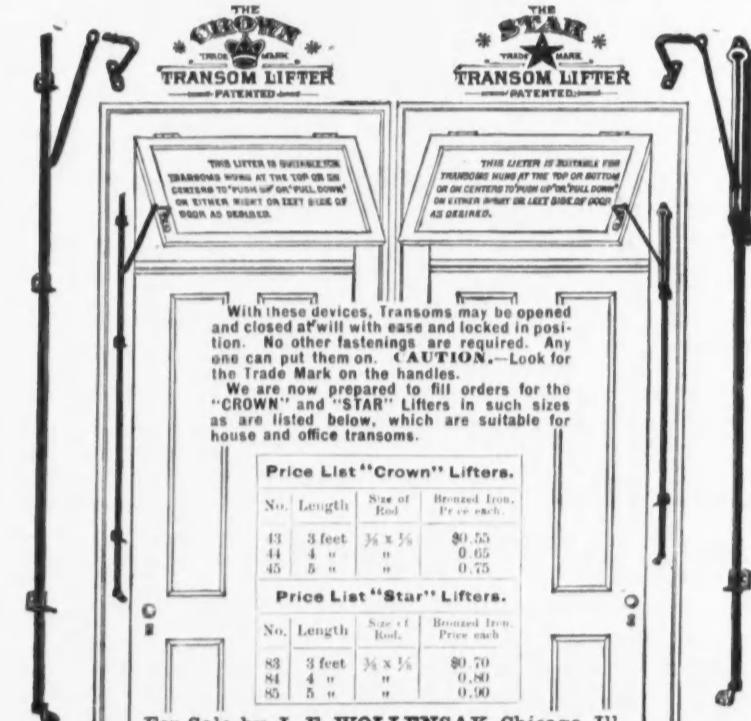
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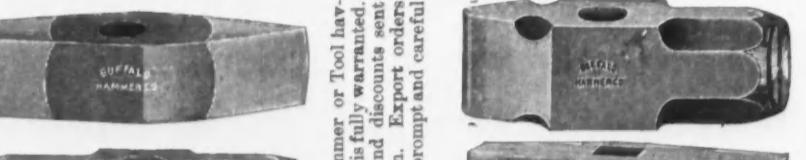


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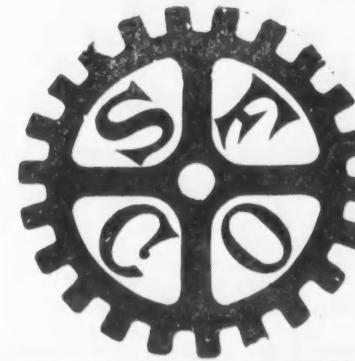
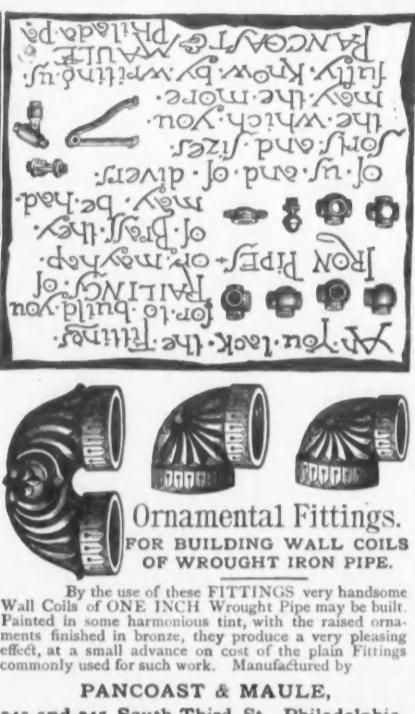
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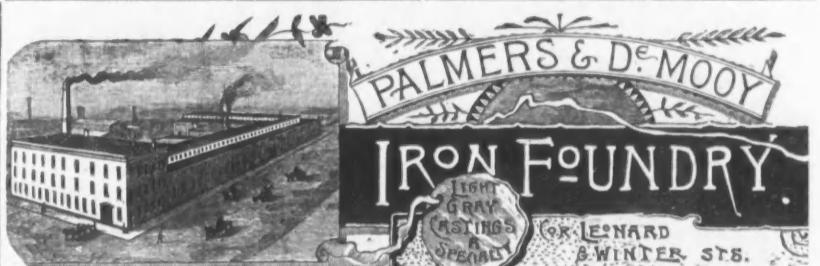
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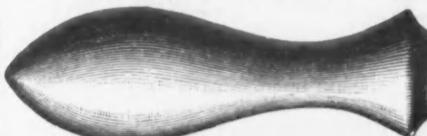
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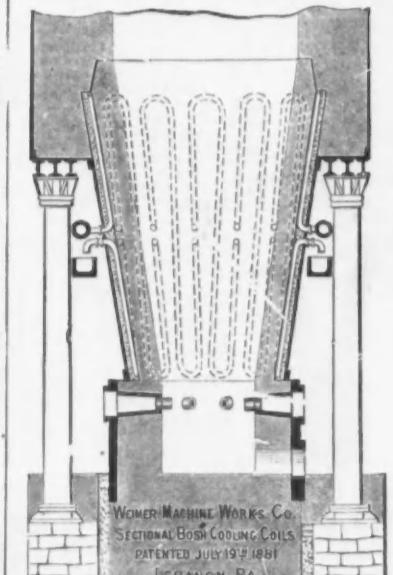
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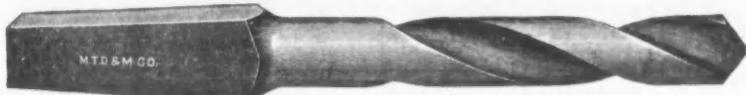
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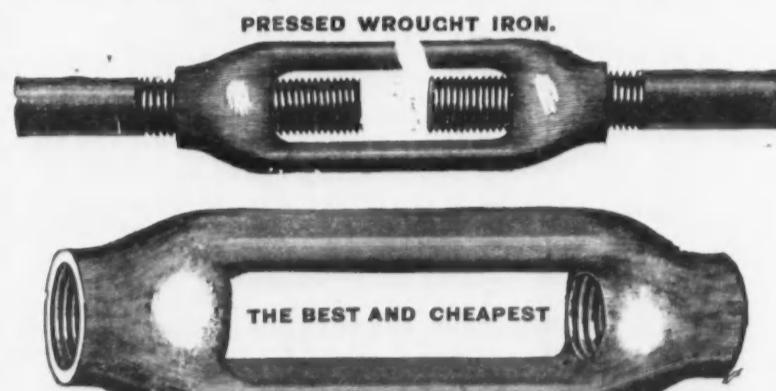


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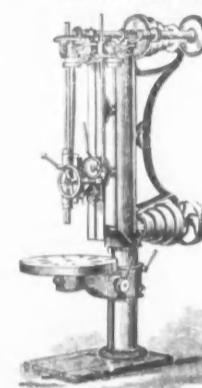
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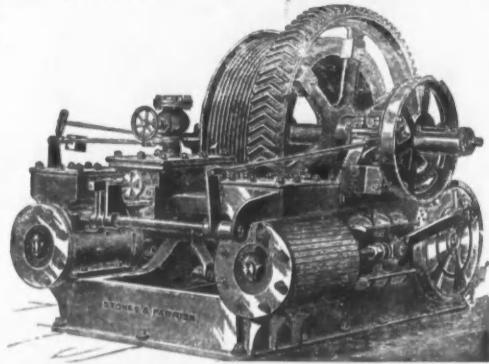
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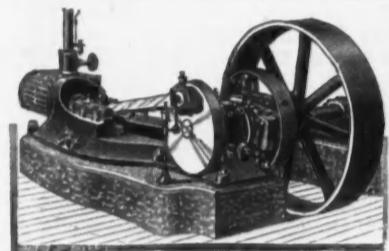
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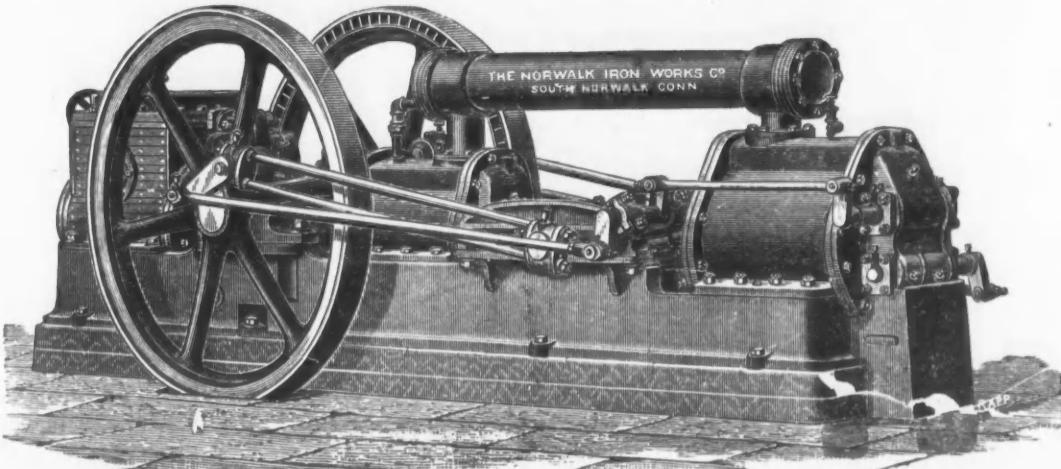
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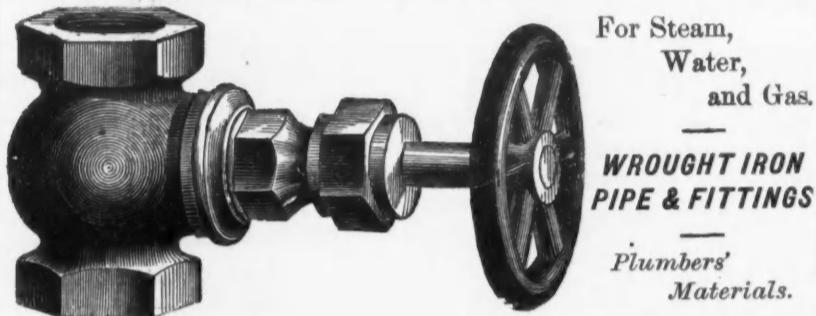
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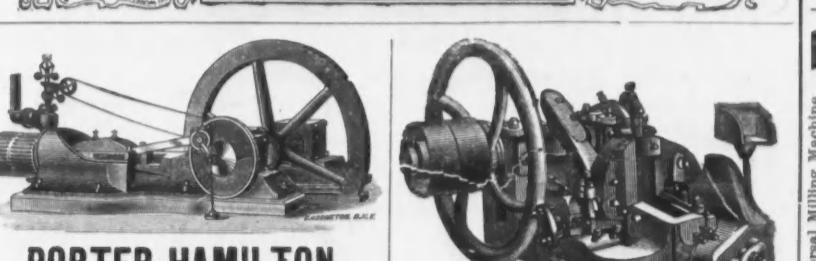
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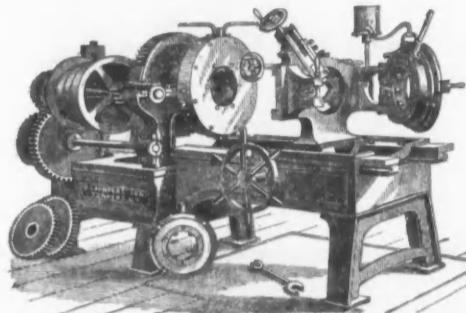
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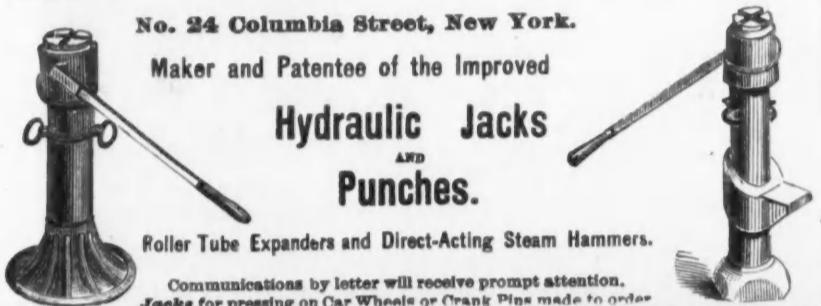
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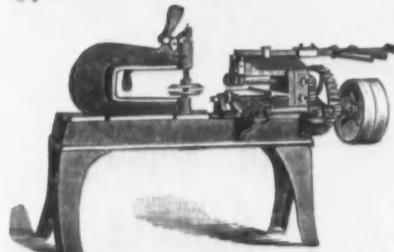
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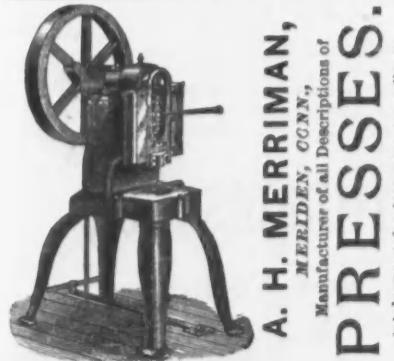
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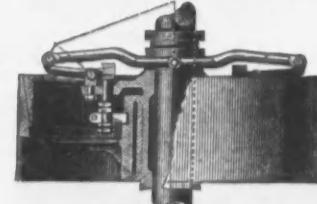
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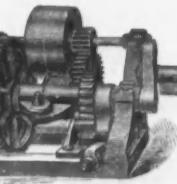
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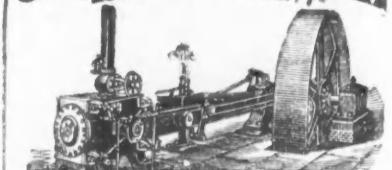
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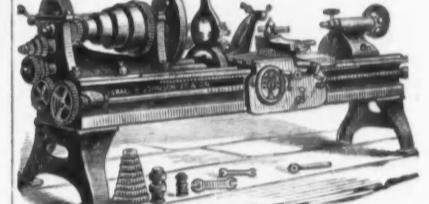
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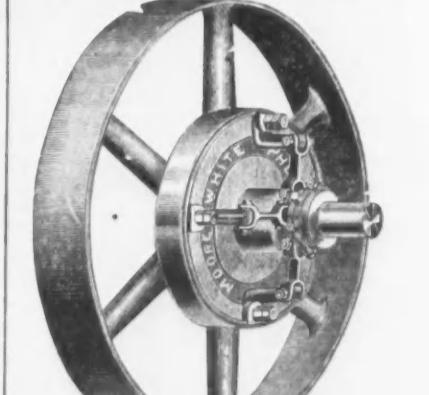
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